

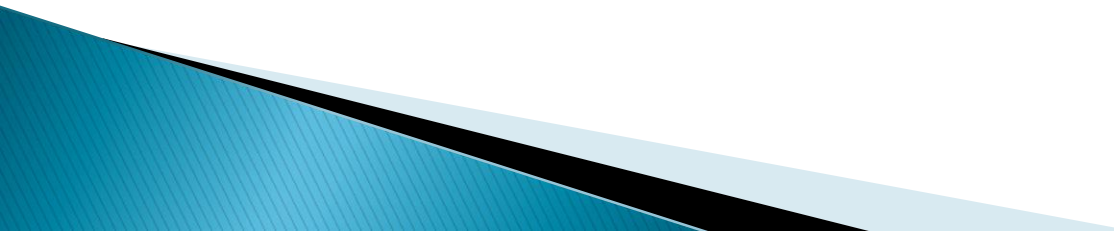
# 2017 Winter Updates

Inspections

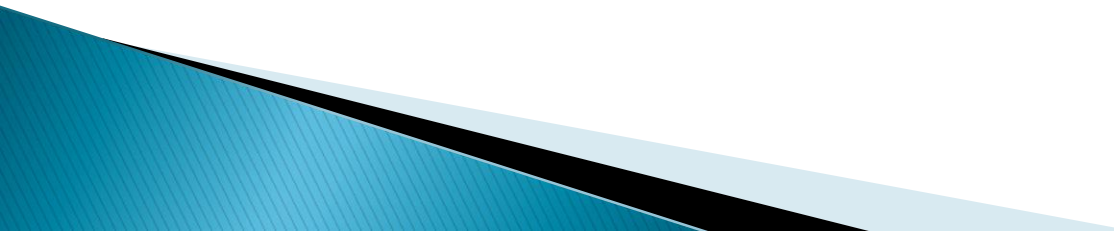
Part I



# Your Presenter

- ▶ Jack Wotruba – HUD/UDC Consultant – DSPS
  - ▶ 11 Years in UDC/HUD programs
  - ▶ 16 Years Commercial Plan reviewer
  - ▶ [Jack.wotruba@wisconsin.gov](mailto:Jack.wotruba@wisconsin.gov)
- 

# Inspections – From The Ground Up

- ▶ This program was not designed and is not intended to limit or change the way or manner in which your inspections are done. It offers a single perspective on the inspection process. Each inspector should have their own methods and processes to get the job done. The goal is always uniformity and compliance with the code.
- 



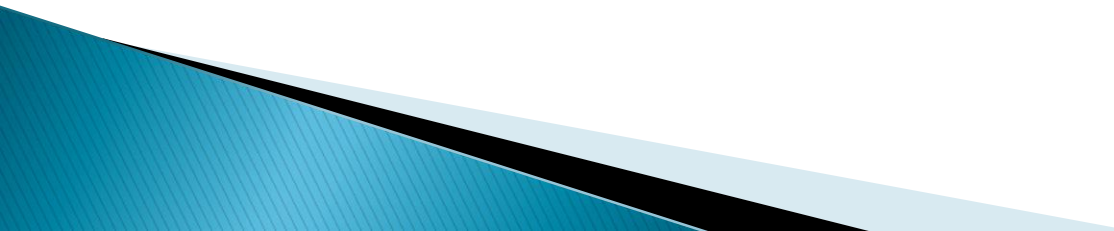




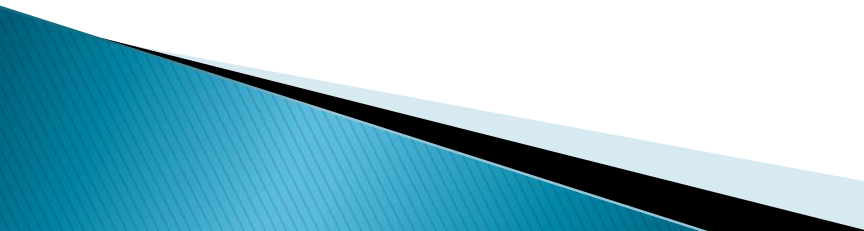
# SPS 320.10 Inspections.

- ▶ (1) INSPECTOR CERTIFICATION. All inspections, for the purpose of administering and enforcing this code, shall be performed by an inspector certified in accordance with ch. [SPS 305](#) who holds the respective credential for the inspection performed.

## 2) GENERAL INSPECTION REQUIREMENTS.

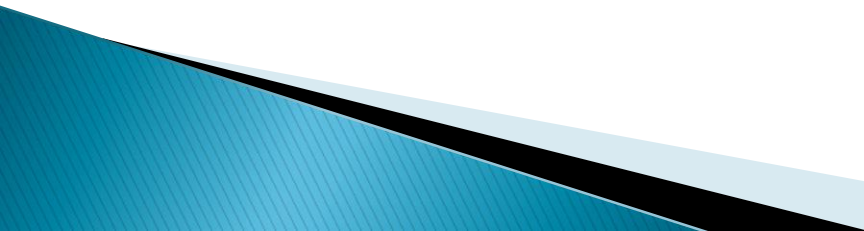
- ▶ (a) *General.* Inspections shall be conducted by the municipality or authorized UDC inspection agency administering and enforcing this code to determine if the construction or installations conform to the conditionally approved plans, the Wisconsin uniform building permit application and the provisions of this code.
- 

## 2) GENERAL INSPECTION REQUIREMENTS.

- ▶ b) *Inspection notice.*
  - ▶ 1. The applicant or an authorized representative shall request inspections from the municipality or authorized UDC inspection agency administering and enforcing this code.
  - ▶ 2. Except as provided under subd. 3., construction may not proceed beyond the point of inspection until the inspection has been completed.
  - ▶ 3. Construction may proceed if the inspection has not taken place by the end of the second business day following the day of notification or as otherwise agreed between the applicant and the municipality or authorized UDC inspection agency.
- 



### 3) INSPECTION TYPES.

- ▶ (a) *General*. The inspections described in pars. (b) to (i) shall be performed to determine if the work complies with this code.
  - ▶ (b) *Erosion control inspection*. Erosion control inspections shall be performed concurrently with all other required construction inspections. Additional inspections for erosion control may be performed by the delegated authority.
- 

# Erosion Control Issues



### (3) INSPECTION TYPES (CONT.)

- ▶ (c) *Foundation excavation inspection.*
- ▶ 1. The excavation for the foundation shall be inspected after the placement of any forms or required reinforcement and prior to the placement of the permanent foundation material.
- ▶ 2. If a drain tile system is required, by the local inspector or by groundwater levels in the excavation, the presence and location of bleeders used to connect the interior and exterior drain tile shall be inspected at the same time as the excavation.





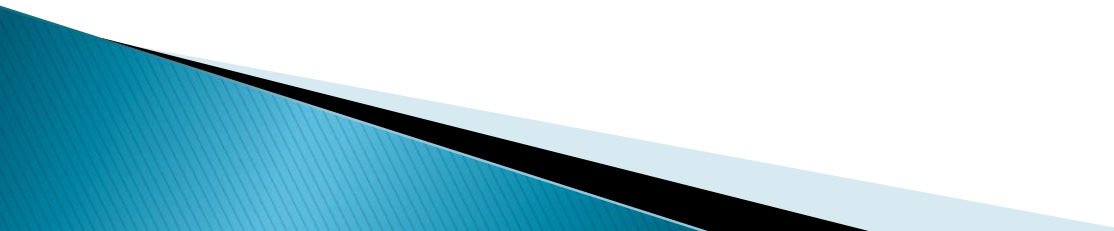
### (3) INSPECTION TYPES. (Cont.)

- ▶ (d) *Foundation reinforcement inspection.* The placement of reinforcement shall be inspected where the reinforcement is required for code compliance.

### (3) INSPECTION TYPES (CONT.)

- ▶ (e) *Foundation inspection.* The foundation shall be inspected after completion. Where damp-proofing, exterior insulation or drain tile are required for code compliance, the foundation shall be inspected prior to backfilling.

### (3) INSPECTION TYPES.


- ▶ (f) *Rough inspection.*
  - ▶ 1. A rough inspection shall be performed for each inspection category listed under subd. 1. a. to e. after the rough work is constructed but before it is concealed.
  - ▶ b. General construction, including framing.
- 



# Inspection types

- ▶ SPS 320.10 Note **Note:** The inspection of the basement floor area should include the following: any underfloor plumbing, electrical, or HVAC
- ▶ Any interior drain tile with base course required under s. [SPS 321.17](#); the structural base course for the floor slab if required under s. [SPS 321.20](#); and the underfloor vapor retarder as required under s. [SPS 322.38](#).

## (f) *Rough inspection.* (Cont.)

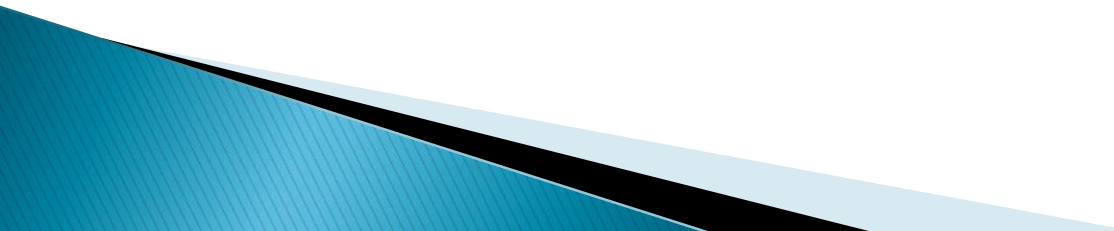
- ▶ c. Rough electrical.
  - ▶ d. Rough plumbing.
  - ▶ e. Rough heating, ventilating and air conditioning.
  - ▶ 2. All categories of work for rough inspections may be completed before the notice for inspection is given, provided the work has not been covered.
  - ▶ 3. The applicant may request one rough inspection or individual rough inspections.
  - ▶ 4. A separate fee may be charged for each individual inspection.
- 

### (3) INSPECTION TYPES. (Cont.)

- ▶ (g) *Insulation inspection.* An inspection shall be made of the insulation and vapor retarders after they are installed but before they are concealed.



### (3) INSPECTION TYPES. (Cont.)

- ▶ (h) *Final inspection.*
  - ▶ 1. Except as provided under subd. 2., the dwelling may not be occupied until a final inspection has been made that finds no critical violations of this code that could reasonably be expected to affect the health or safety of a person using the dwelling.
  - ▶ 2. Occupancy may proceed in accordance with local ordinances if the inspection has not been completed by the end of the fifth business day following the day of notification or as otherwise agreed between the applicant and the department or municipality.
- 

### (3) INSPECTION TYPES. (Cont.)

- ▶ (i) *Installation inspection.* An inspection shall be performed on the installation of a manufactured home or modular home.
- ▶ SPS 320.10 Note **Note:** The design and construction of manufactured homes is regulated by the federal Department of Housing and Urban Development under Title 24 CFR Part 3280.

AS EVIDENCED BY THIS LABEL NO.

NTA1394048

THE MANUFACTURER CERTIFIES TO THE BEST OF THE  
MANUFACTURER'S KNOWLEDGE AND BELIEF THAT THIS  
MANUFACTURED HOME HAS BEEN INSPECTED IN ACCORD-  
ANCE WITH THE REQUIREMENTS OF THE DEPARTMENT OF  
HOUSING AND URBAN DEVELOPMENT AND IS CONSTRUCTED  
IN CONFORMANCE WITH THE FEDERAL MANUFACTURED  
HOME CONSTRUCTION AND SAFETY STANDARDS IN EFFECT  
ON THE DATE OF MANUFACTURE. SEE DATA PLATE.

# UDC Construction Checklist

- ▶ The Department has developed a checklist that can be utilized to assist in inspection duties.
- ▶ Checklist can be found on the Department UDC Webpage. Checklist can be found on the “Forms” tab.



320.09 (09)

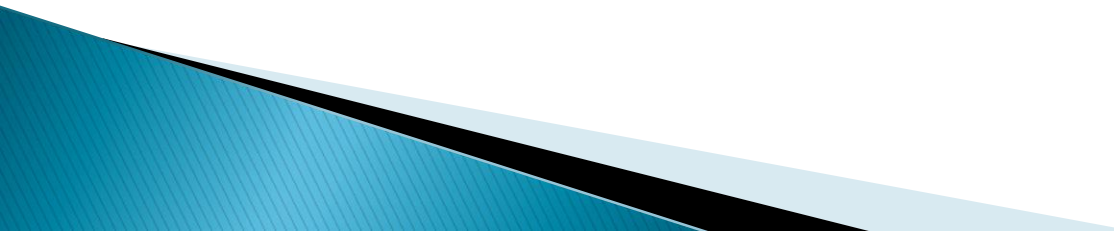
Permit card  
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# PART II

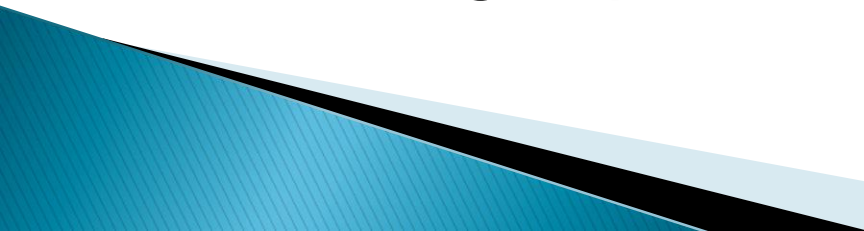
## ▶ FOOTING AND FOUNDATION INSPECTIONS



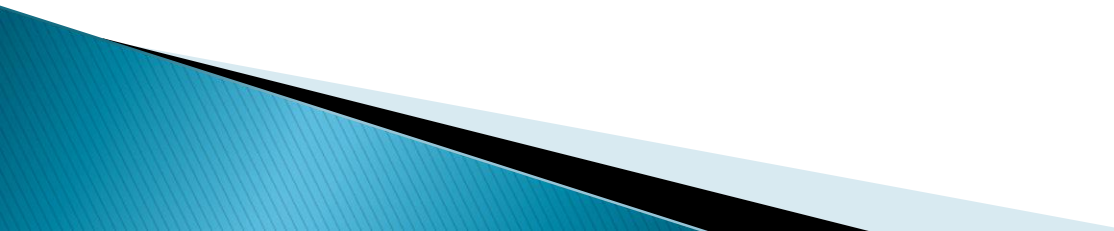
# SPS 321.16

- ▶ Frost Protection: 48" frost depth
  - ▶ a) Frost protected shallow foundations shall be designed in accordance with ASCE-32 as adopted in Table 320.24-5.
  - ▶ (b) Portions of footings or foundations located directly under window areaways do not require frost protection provided the rest of the foundation is protected in accordance with this section.
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# SPS 321.16 (continued)

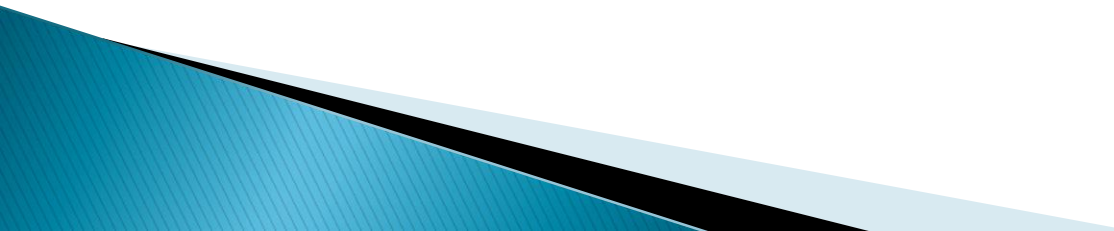
- ▶ (c) Footings and foundations may bear directly on bedrock less than 48 inches below adjacent grade provided all of the following conditions are met.
  - ▶ 1. The rock shall be cleaned of all earth prior to placement.
  - ▶ 2. All clay in crevices of the rock shall be removed to the level of frost penetration or to 1.5 times the width of the rock crevice, whichever is less.
  - ▶ 3. Provisions shall be taken to prevent water from collecting anywhere along the foundation.
- 

# SPS 321.15

- ▶ Footings: (a) *Continuous footings*. The minimum width of the footing on each side of the foundation wall shall measure at least 4 inches wider than the wall. The footing depth shall be at least 8 inches nominal. Footing placed in unstable soil shall be formed. Lintels may be used in place of continuous footings when there is a change in footing elevation.
- 

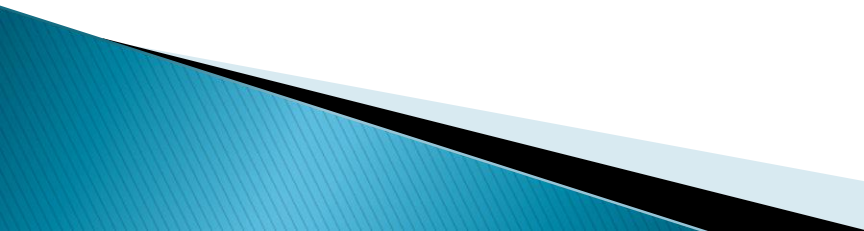
# SPS 321.15

(cont.)

- ▶ (b) *Column or pier footing.*
  - ▶ 1. The minimum width and length of column or pier footings shall measure at least 2 feet by 2 feet.
  - ▶ 2. The minimum depth of column or pier footings shall measure at least 12 inches nominal.
- 

# SPS 321.15

(cont.)

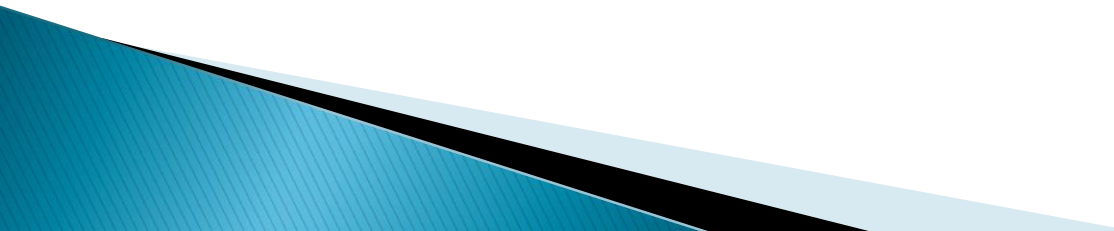
- ▶ (c) *Trench footings*. Footings poured integrally with the wall may be used when soil conditions permit. The minimum width shall be at least 8 inches nominal.
  - ▶ (d) *Chimney and fireplace footings*. Footing for chimneys or fireplaces shall extend at least 4 inches on each side of the chimney or fireplace. The minimum depth shall measure at least 12 inches nominal.
  - ▶ (e) *Floating slabs*. Any dwelling supported on a floating slab on grade shall be designed through structural analysis.
- 

# SPS 321.17

- ▶ (a) *New construction.*
- ▶ SPS 321.17(1)(a)1.1. Except as provided under sub. (2), a complete drain tile or pipe system shall be installed around the foundation of dwellings under construction where groundwater occurs above the bottom of the footing.



# SPS 321.17 (continued)

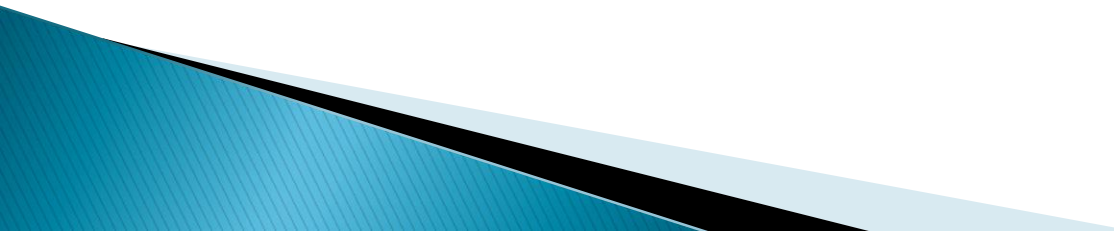
- ▶ (b) *Basement floor slabs.* The basement slab shall be placed on at least 4 inches of clean graded sand, gravel or crushed stone.
  - ▶ a. Bleeder tiles or pipes shall be provided at no more than 8-foot intervals to connect the exterior drain tile or pipe to the interior drain tile or pipe.
  - ▶ 1. Drain tiles or pipe shall be connected to the sump pit.
- 

# SPS 321.18

- ▶ Rebar or other reinforcement per plans.
- ▶ Block foundation walls damp proofed.
- ▶ Walls braced or floor system installed prior to back-filling.



# SPS 321.20

- ▶ Basement Floors at least 3" thick.
  - ▶ Storm crock lip to be 1" above basement floor.
  - ▶ Garage floors required to be 4" thick.
  - ▶ Garage floors must slope toward overhead doors, or a floor drain shall be provided.
  - ▶ Also see SPS 325.01(4) for complete garage floor drain requirements.
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# Wood Foundations

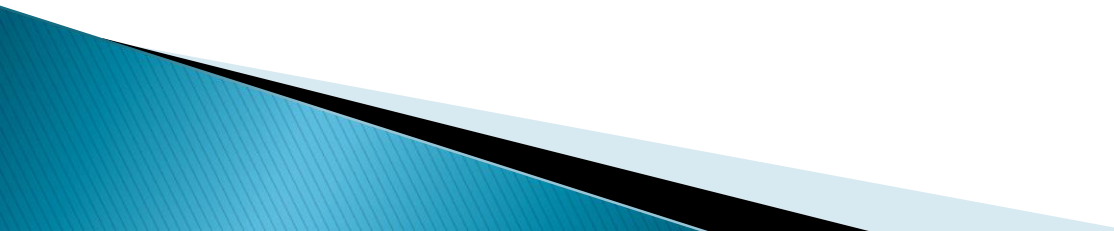
- ▶ Despite there being items for wood foundation on the inspection checklists, We will not be covering them in this program.



# Part III

## ▶ FRAMING INSPECTIONS

# GENERAL

- ▶ Suggested order of inspection. Inspect in general order from top to bottom.
  - ▶ Attempt to follow load path to earth.
  - ▶ Special care for point loads
  - ▶ Check for adequate Fastening
  - ▶ Metal Anchors – all holes generally filled with proper connector nails.
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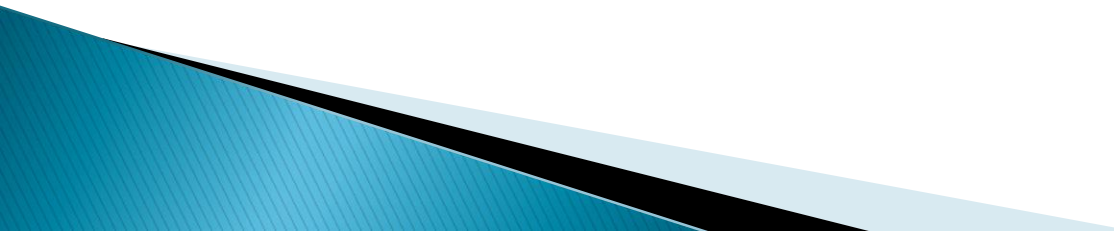
# Roofs

- ▶ (a) *Structural sheathing*. The allowable loads and spans for structural sheathing shall be in accordance with the grade stamp on the panel.
- ▶ (b) *Roof boards*.
  - ▶ 1. Where the rafter spacing is 24 inches on center or less, roof boards may be used that have a minimum thickness of 5/8-inch for solid sheathing and 3/4-inch for spaced sheathing.
  - ▶ 2. Where the rafter spacing is greater than 24 inches on center, roof boards shall be tongue and groove, at least 1.5 inches thick.

# Roofs

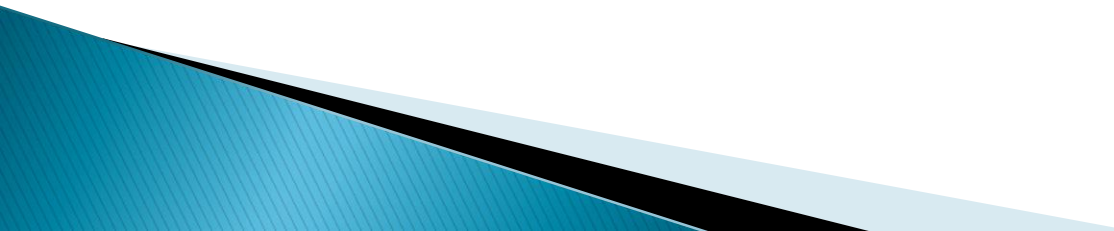
- ▶ Tenant Separations – If applicable, tenant separation walls may need to extend into and through the roof/attic area.

# Rafters (2x Sawn)

- ▶ 1. Rafters shall be notched to fit the exterior wall plate and fastened to the wall.
  - ▶ 2. Collar ties shall be installed on the upper third of every third pair of abutting roof rafters or every 48 inches, whichever is less.
- 



# Rafters

- ▶ 1. Where rafters meet to form a ridge, the rafters shall be attached to a ridge board.
  - ▶ 2. The ridge board shall have a depth at least equal to the length of the cut end of the rafter abutting it.
  - ▶ 3. Where all rafters are placed directly opposite each other or are offset at the ridge board by less than the thickness of the rafter, the ridge board shall have a nominal thickness of at least 1 inch.
- 

# Rafters

- ▶ 4. Where one or more rafters are offset at the ridge board by more than the thickness of the rafter, the ridge board shall have a nominal thickness of at least 2 inches.




# Rafters

- ▶ Where no bearing is provided under valley rafters at the intersection of 2 roof areas, the valley rafters shall be doubled in thickness and shall be at least 2 inches deeper than the required common rafter to permit full bearing at the beveled end.

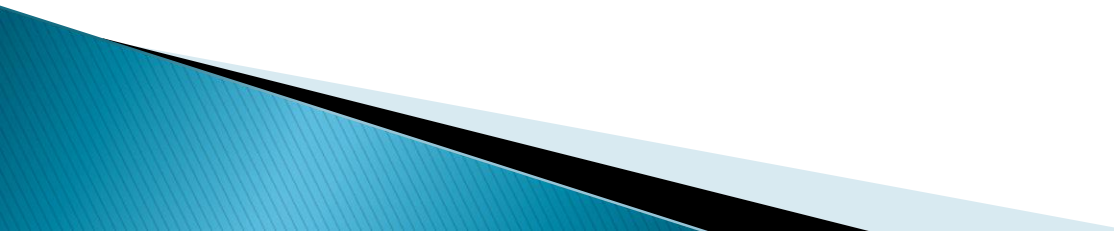
# Rafters

- ▶ 2. Notching and boring of ceiling joists and rafters shall comply with pars. (b) and (c).
- ▶ b) *Notching*.
- ▶ 1. Notches located in the top or bottom of ceiling joists and rafters are prohibited from all of the following:
  - ▶ a. Having a depth exceeding  $1/6$  the depth of the member.
  - ▶ b. Having a length exceeding  $1/3$  the depth of the member.
  - ▶ c. Being located in the middle  $1/3$  of the span of the member.

# Rafters


- ▶ c) *Boring.*
  - ▶ 1. Holes bored within 2 inches of the top or bottom of ceiling joists or rafters may not be located in the middle  $1/3$  of the span of the member.
  - ▶ 2. The diameter of a hole may not exceed  $1/3$  the depth of the member.
  - ▶ 3. A hole may not be bored within 2 inches of a notch or another hole.
  - ▶ 4. The distance between adjacent holes may not be less than the diameter of the larger hole.
- 

# Wood Joist

- ▶ a. Wood joists supported on wood or metal shall have a bearing surface of at least  $1\frac{1}{2}$ –inches measured from the end of the joist.
  - ▶ b. Wood joists supported on masonry or concrete shall have a bearing surface of at least 3 inches measured from the end of the joist.
- 



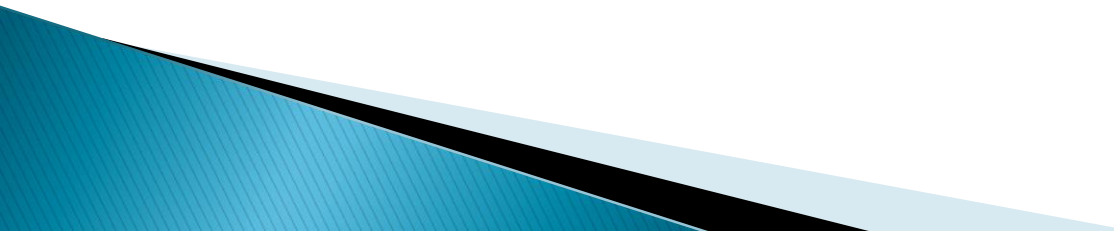
# Ladders

- ▶ *Ladders.*
  - ▶ 1. Overhangs at gable end walls of more than 12 inches shall be provided with ladders which extend into the structure a distance no less than the length of the overhang.
  - ▶ 2. The ladders shall be fastened at the wall.
  - ▶ 3. The interior end of each ladder shall be attached to a rafter or truss with a hanger
- 

# Roof Trusses

- ▶ a) Metal plate connected wood roof trusses shall be designed in accordance with TPI 1 and the NDS adopted under s. SPS 320.24.
- ▶ (b) Truss members shall not be cut, bored or notched, except as allowed under sub. (8) (d).
- ▶ (c) If connection is provided to stabilize a non-load bearing wall, a slotted expansion joint or clip shall be used.

# Girder Trusses

- ▶ Must be properly laminated.
  - ▶ Typical staggered on-center spacing is 10" top chord; 3" bottom chord,; and 4" at webs.
  - ▶ Proper hangers for common trusses
  - ▶ Proper columns or multiple studs for ends of girder trusses.
- 

# Girder Truss Bracing

- ▶ Permanent bracing as required on plans
- ▶ Lateral Bracing requirements also per truss plans

# Ceiling Joist

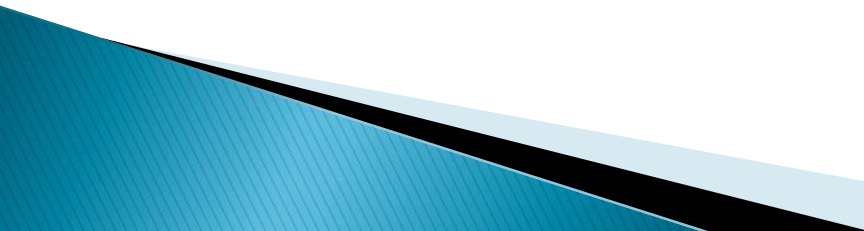
- ▶ (a) Ceiling joists shall be nailed to exterior walls and to the ends of rafters.
- ▶ (b) Ends of ceiling joists shall be lapped at least 3 inches and be fastened either with 3-16d nails or in accordance with the floor joist requirements under s. SPS 321.22 (4) (a) 1. d.

# Ceiling Joist

- ▶ (c) Where ceiling joists are placed at right angles to the rafters, the lookout joist or ties shall be fastened to the parallel ceiling joists or rafters using engineered clips, straps or hangers or the connection shall be designed through structural analysis.
- ▶ **Note:** See the fastener table in the ch. [SPS 325 Appendix A](#) for a nailing schedule for ceiling joists



# Ceilings – SPS 321.06

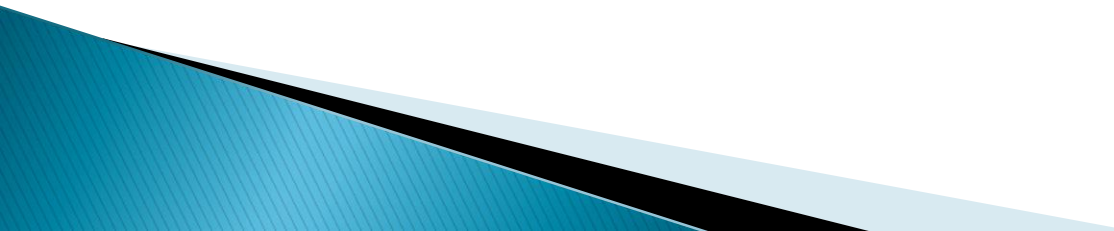
- ▶ All habitable rooms, kitchens, hallways, bathrooms and corridors shall have a ceiling height of at least 7 feet, except as follows:
  - ▶ (a) Rooms may have ceiling heights of less than 7 feet provided at least 50% of the room's floor area has a ceiling height of at least 7 feet. Any area with a ceiling height of less than 5 feet may be ignored in this calculation.
- 



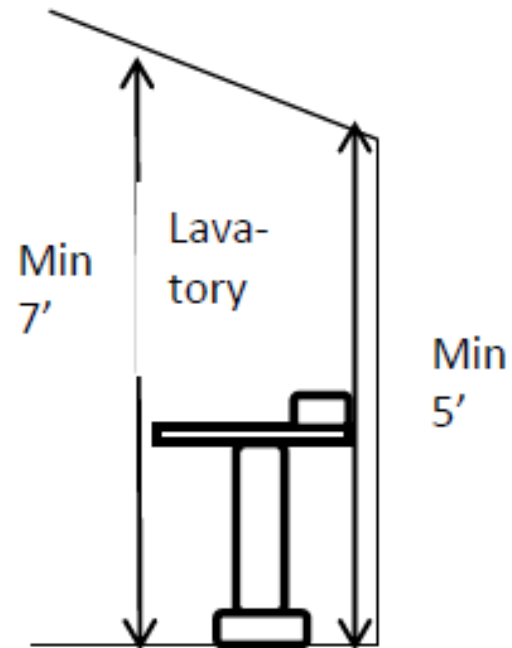
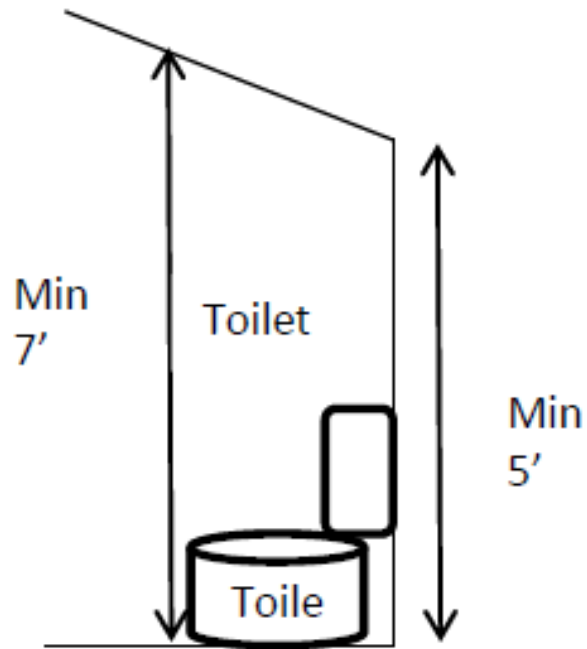
# Ceilings

- ▶ (2) Beams and girders or other projections may project to no more than 8 inches below the required ceiling height.

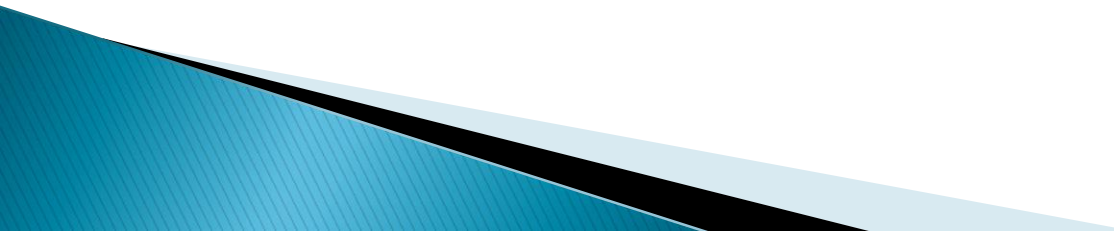
# Ceilings

- ▶ (3) The ceiling height extending back from the front edge of a water closet may slope to below 7 feet, but may not go below 5 feet until beyond the back of the water closet.
  - ▶ (4) The ceiling height extending back from the front edge of a lavatory may be less than 7 feet, but may not go below 5 feet until beyond the back of the lavatory.
- 

# Bathroom Ceiling Heights



# Ceilings

- ▶ (5) A ceiling height of less than 7 feet may be provided between the rear rim of a bathtub and a wall of the room abutting that rim, or between the side rim and a room wall abutting that rim.
  - ▶ (6) A ceiling height of less than 7 feet may be provided between the rear wall of a shower stall and a wall of the room abutting that rear wall, or between the side wall of a shower and a room wall abutting that side wall.
- 

# Attic Access

- ▶ 1) ATTIC. Attics with 150 or more square feet of area and 30 or more inches of clear height between the top of the ceiling framing and the bottom of the rafter or top truss chord framing shall be provided with an access opening of at least 14 by 24 inches, accessible from inside the structure.

# Frame Walls

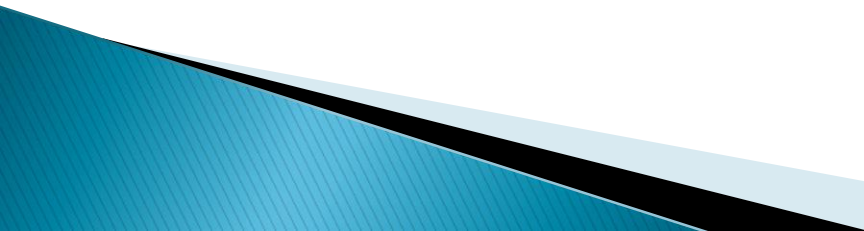
- ▶ **STUD CONFIGURATION.** Wood studs shall comply with the size and spacing requirements indicated in Table 321.25–A. Studs in the exterior walls shall be placed with the wide faces perpendicular to the plane of the wall.



# Frame Walls

- ▶ (2) TOP PLATES.
- ▶ (a) *General*. Except as allowed under subd. 3., top plates shall be provided and configured as follows:
  - ▶ 1. Studs at bearing walls shall be capped with double top plates.
  - ▶ 2. End joints in double top plates shall be offset at least 2 stud spaces.

# Exterior Water Resistant Covering

- ▶ Exterior walls of wood or metal frame construction shall be provided with a water resistive barrier from the highest point to the bottom of the permanent weather resistant covering
  - ▶ Structural products with and integral water resistive barrier may be approved by the department as a complete assembly
  - ▶ Water-resistive barrier material shall be compatible with the other materials in the wall with which it will come into contact
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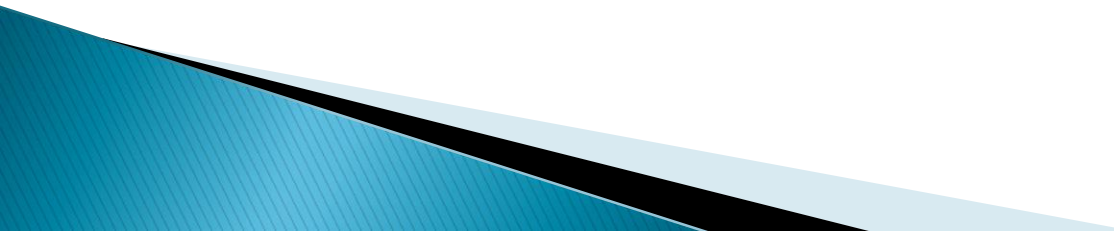


# Top Plates

- ▶ 3. Double top plates shall be overlapped at the corners and at intersections of partitions.
- ▶ 4. The plate immediately above the stud may have a joint only when directly over the stud.



# Top Plates

- ▶ (b) *Notching and boring.*
  - ▶ 1. When piping or ductwork is placed in an exterior wall or an interior load-bearing wall, such that at least half of the top plate is removed, the plate shall be reinforced with a steel angle at least 2 inches by 2 inches by 20 gauge thick.
  - ▶ 2. The steel angle shall span the gap and extend at least to the midpoint of the adjacent stud spaces.
- 



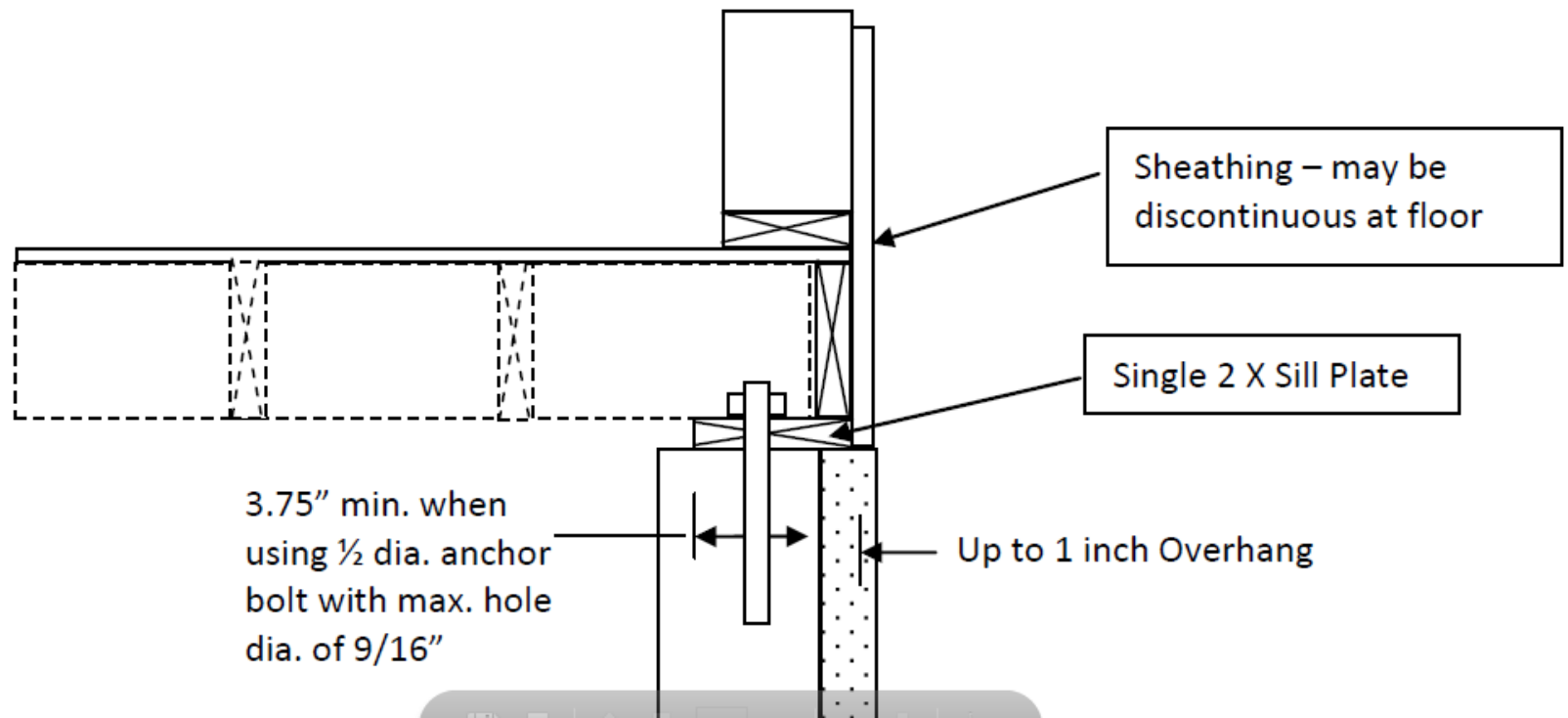


# Bottom Plates

- ▶ 1. Where a masonry foundation wall has an open top course, a bottom plate at least as wide as the foundation wall shall be fastened to the foundation.
- ▶ 2. Where anchor bolts are used on a masonry foundation wall with an open top course, the minimum width of an individual piece making up the bottom plate shall be at least 5 1/2 inches.
- ▶ SPS 321.25 Note **Note:** A sill plate can be made of multiple pieces to achieve the full width.

# Bottom Plates

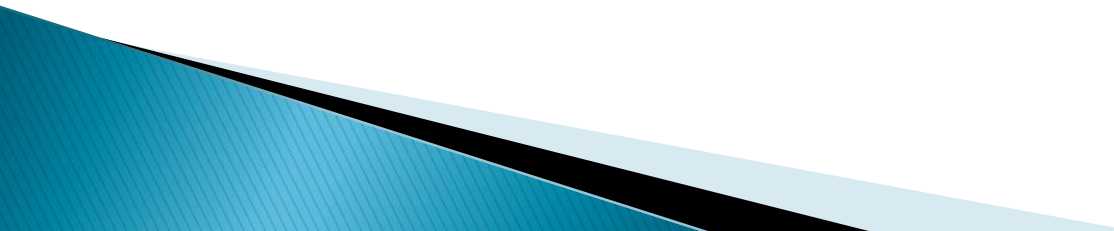
- ▶ ) *Extension beyond the bearing surface.* All of the following requirements apply to a sawn-lumber sill plate with uniform loading that is partially extended beyond the load-bearing surface of a foundation wall in order to put the exterior surface of an upper-lying wall flush with or beyond the exterior surface of insulation which is placed on the outside of the foundation wall:

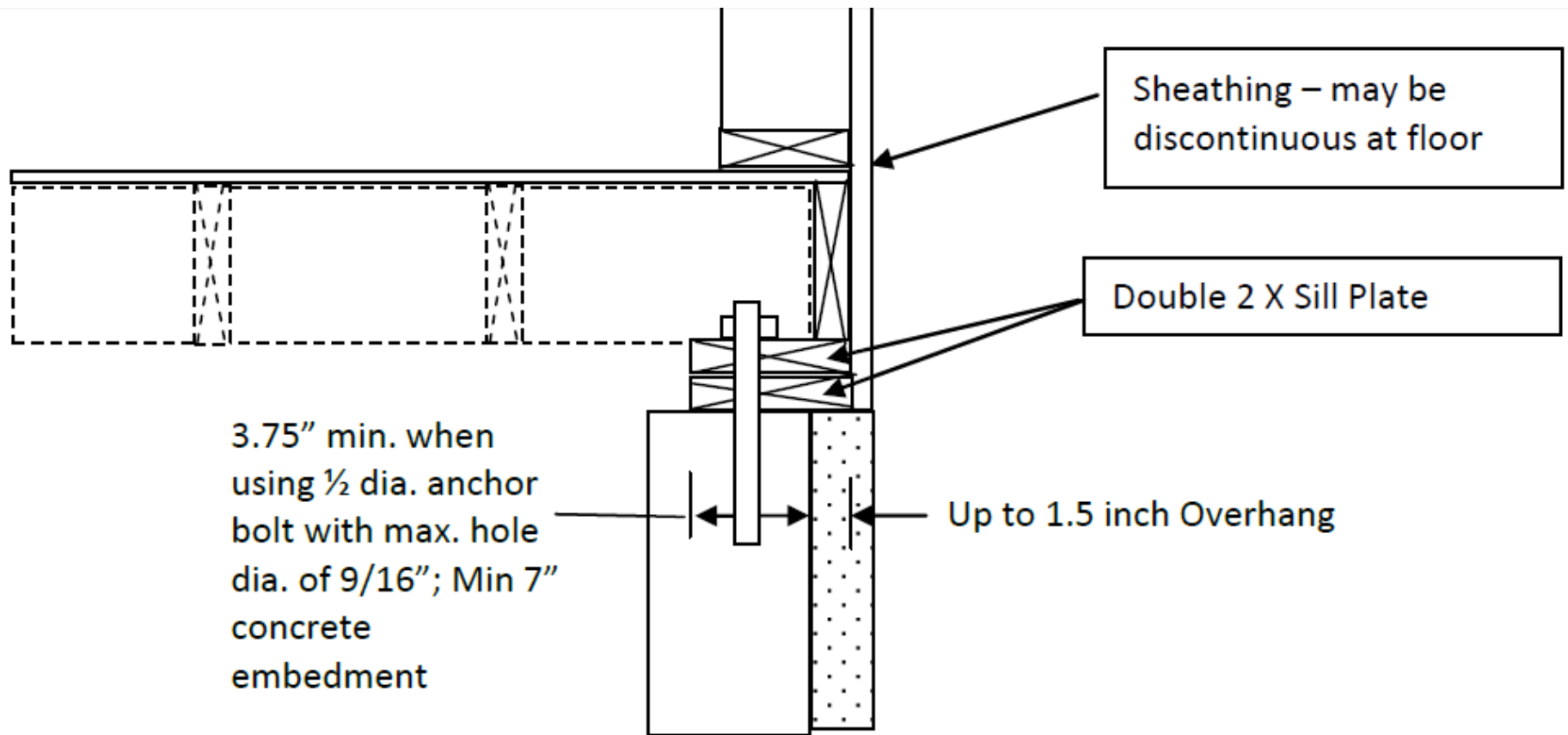


# Bottom Plates

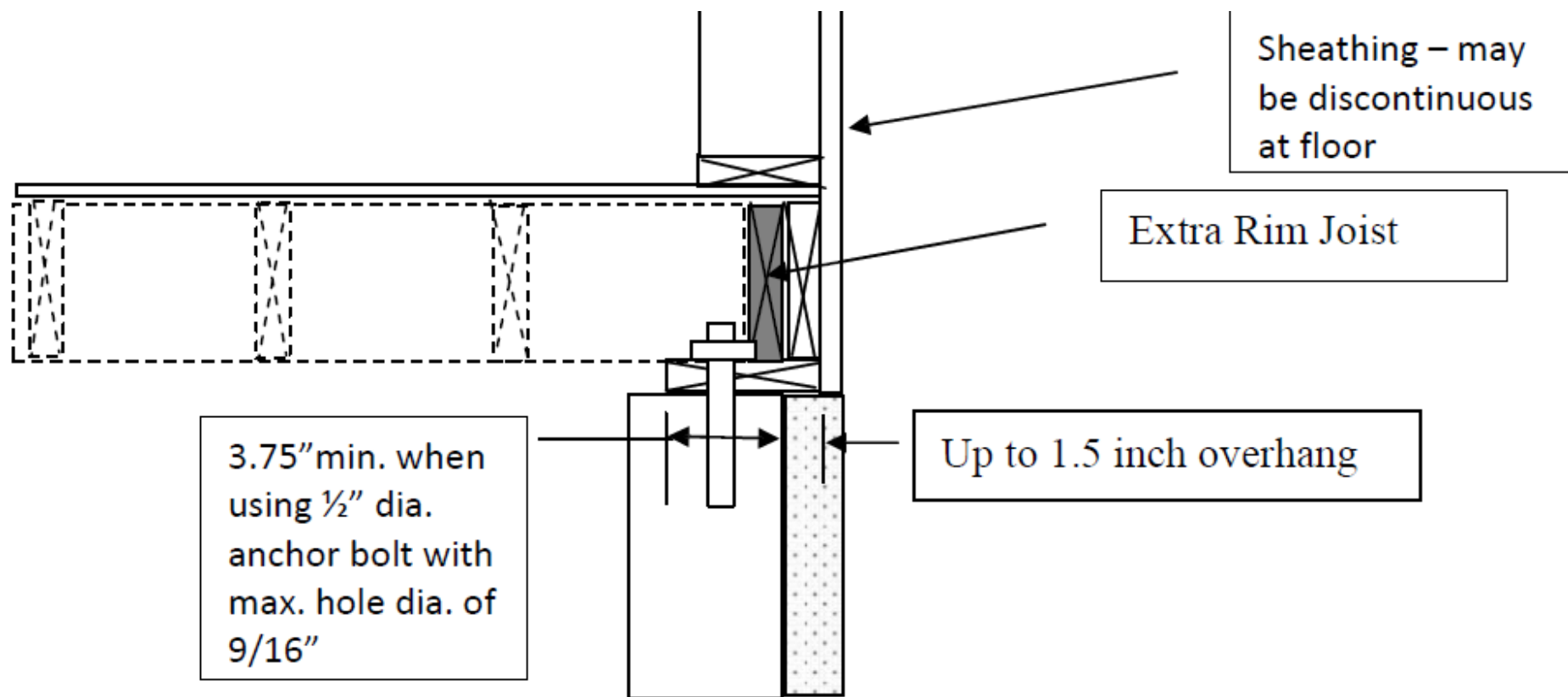
- ▶ 1. The center of any anchor bolt shall be set back from the side edge of the sill plate by a distance of at least 4 times the diameter of the bolt.
- ▶ 2. The thickness of the concrete or mortar cover around any anchor bolt shall comply with ACI 318 section 7.7.
- ▶ SPS 321.25 Note **Note:** Under ACI 318 section 7.7, the minimum cover for a 5/8-inch-diameter or smaller bolt is 1 1/2 inches.

# Bottom Plates

- ▶ 3. Where a stud wall bears directly on a double bottom plate, the plate may not extend more than 1 1/2 inches beyond the load-bearing surface of the foundation wall.
  - ▶ 4. Where a stud wall bears directly on a single bottom plate, the plate may not extend more than 1 inch beyond the load-bearing surface of the foundation wall.
- 

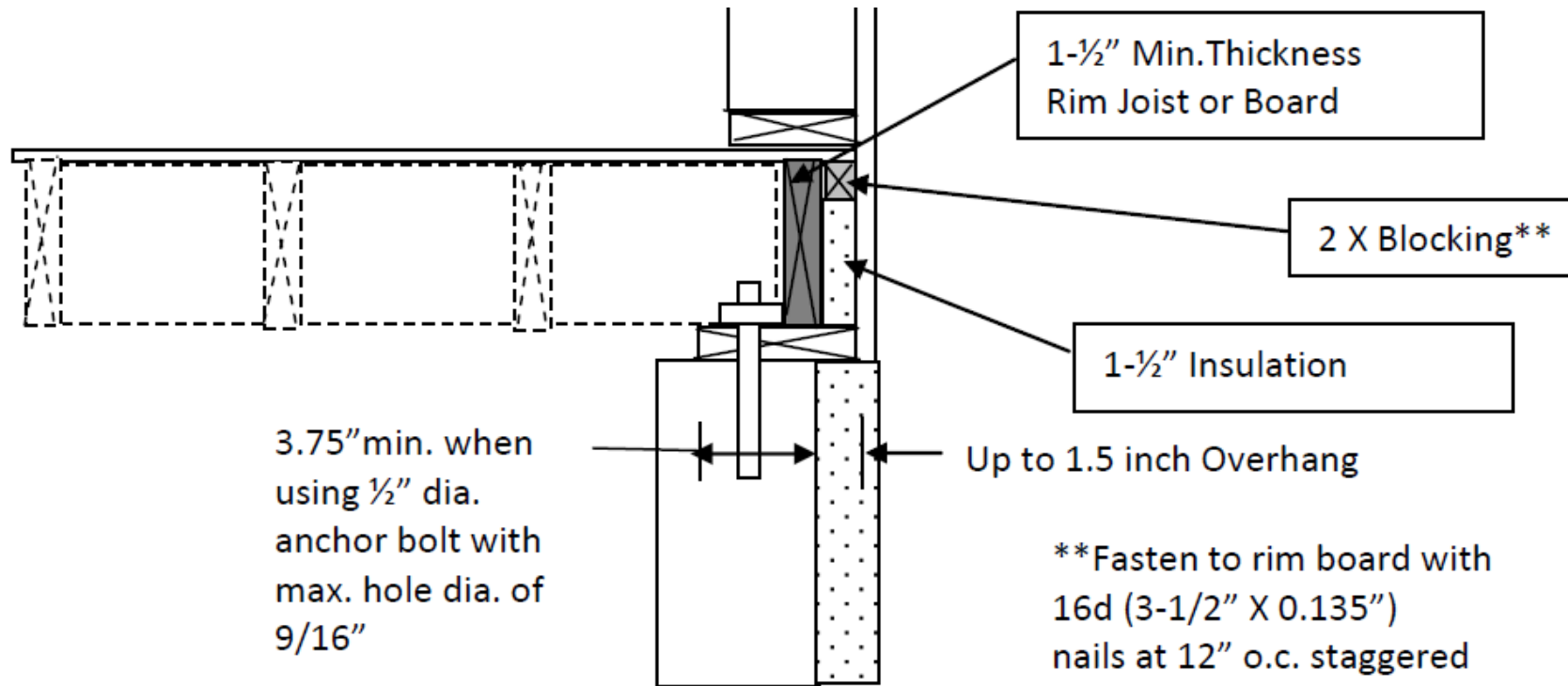


**Option 2 – Double Sill Plate With Floor Framing Perpendicular or Parallel to Foundation**

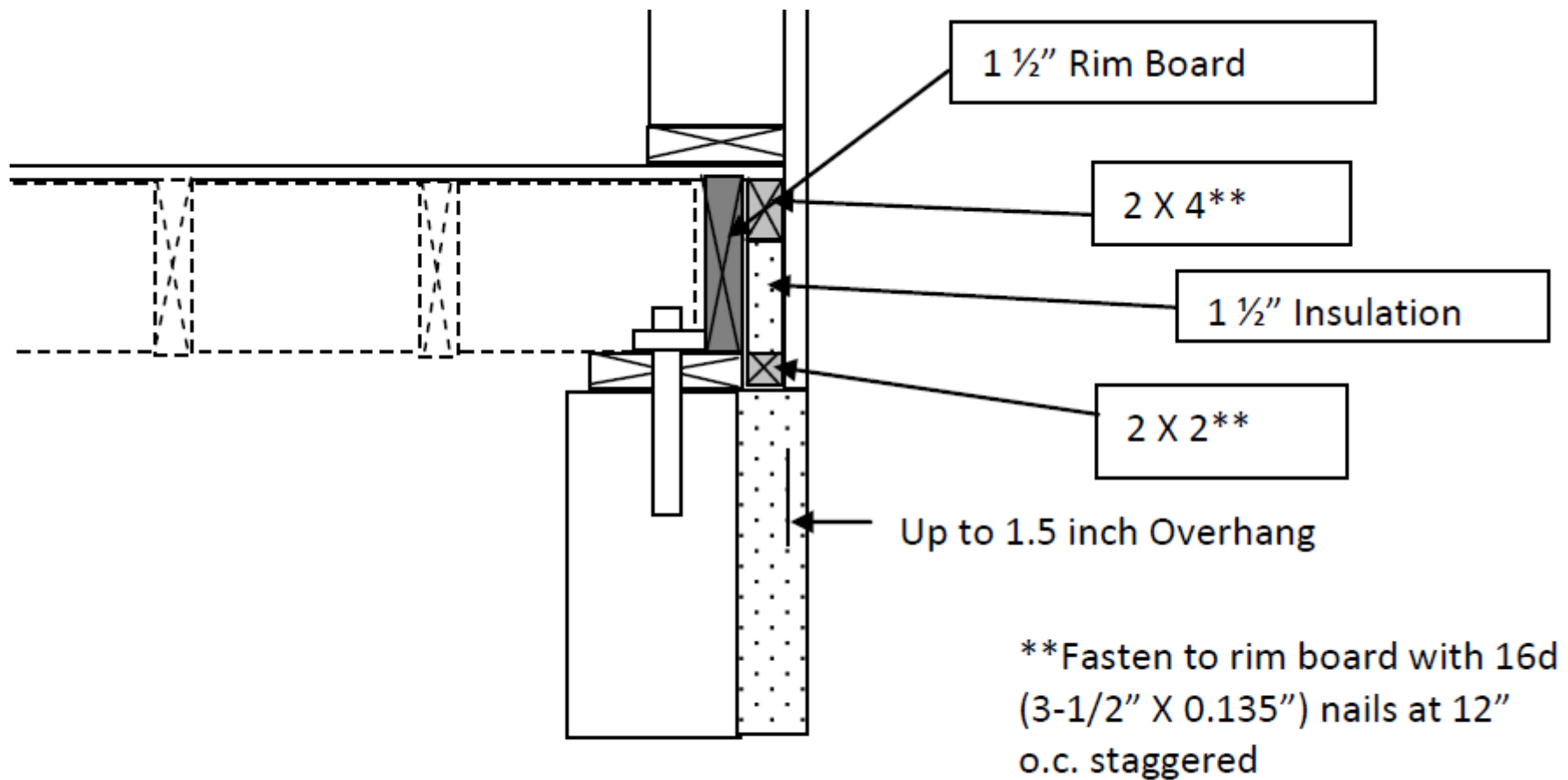


**Option 3 – Double Rim Joist With 2X Framing  
Perpendicular or Parallel to Foundation Wall**





**Option 4 – Double Rim Joist With 2X Framing  
Perpendicular or Parallel to Foundation Wall**



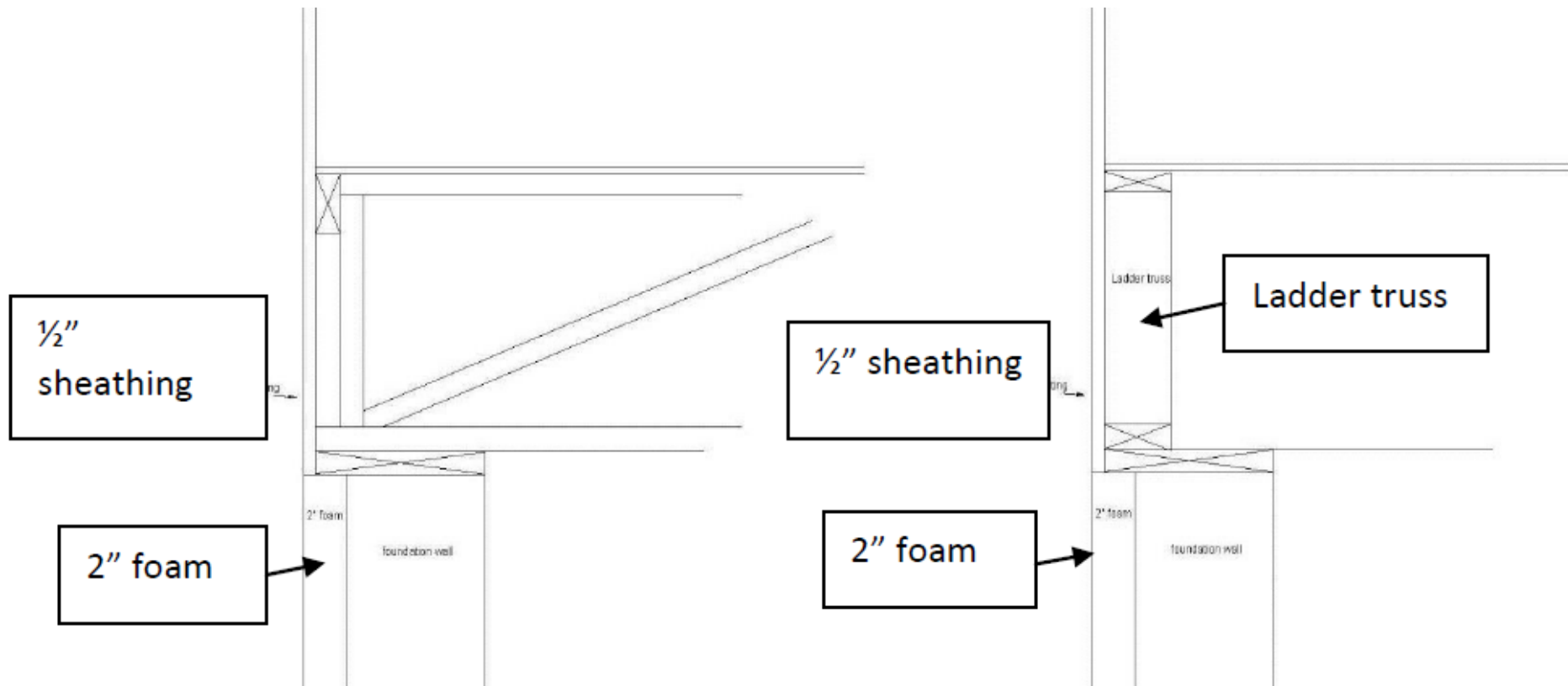
**Option 5 – Double Rim Joist With 2X Framing**  
**Perpendicular or Parallel to Foundation Wall**

### 321.22(4) Details for floor trusses manufactured by members of the Structural Building Components Association (courtesy of SBCA)

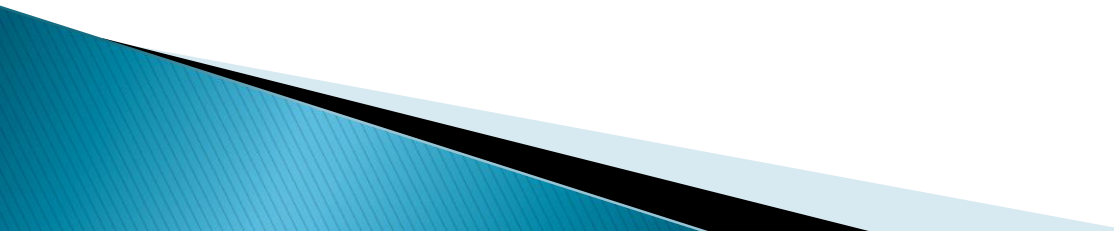
These detail address the issue of cantilevered sill plates supporting metal plate connected wood trusses installed parallel and perpendicular to the foundation walls where there is a potential for discontinuous planes between the exterior wall above the sill plate and the foundation insulation planes. The example below is based on the following assumptions:

- Exterior wall sheathing is any thickness to align the exterior face of the sheathing with the exterior face of the sheathing below.
- Basement continuous insulation is installed on the exterior of the foundation and does not exceed 2".
- Floor system is bottom chord bearing metal plate connected wood trusses.
- The sill plate does not overhang the foundation by more than 1-9/16".

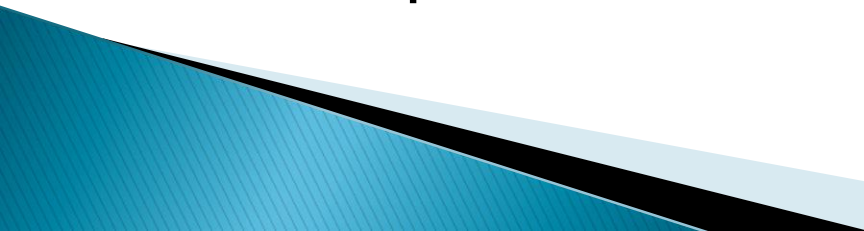
It is important that all structural, energy, and durability requirements be taken into account.



# Bottom Plates

- ▶ 3. Anchor bolts.
  - ▶ a. Structural steel anchor bolts, at least 1 / 2 inch in diameter, embedded at least 7 inches into the concrete or grouted masonry with a maximum spacing of 72 inches and located within 18 inches of wall corners.
  - ▶ b. A properly sized nut and washer shall be tightened on each bolt to the plate or sill.
- 

# Bottom Plates

- ▶ c. When vertical-reinforcing steel is provided in masonry construction, as required under sub. (3), the location requirements under subd. 3. a. shall be modified as necessary so anchor bolts are placed in the same core as the reinforcement without exceeding the limits of subd. 3. a.
  - ▶ d. Alternate foundation anchorage, designed and spaced in accordance with structural analysis and as required to provide equivalent anchorage to the requirements of subd. 3. a., is allowable.
- 

# Wall Openings

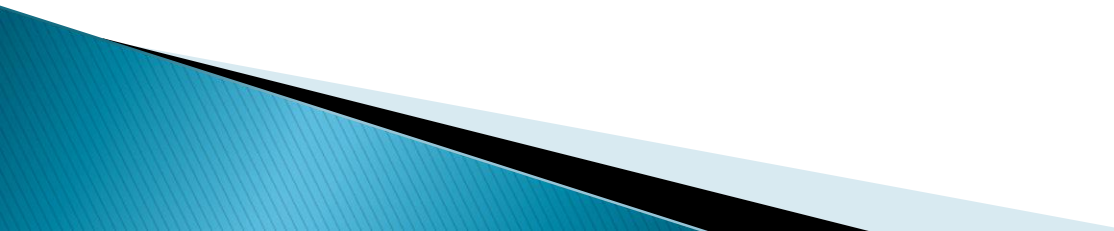
- ▶ (am) *Headers*. Where doors or windows occur, headers shall be used to carry the load across the opening.
- ▶ (bm) *Header size*. The size of headers shall be determined in accordance with the spans and loading conditions listed in Tables 321.25–B, 321.25–C and 321.25–D. Headers for longer spans shall be designed by an engineering method under s. [SPS 321.02](#).



# Headers

- ▶ (cm) *Header support.* Headers in bearing walls shall be supported in accordance with subd. 1. or 2. or 3.
- ▶ 1. Headers 3 feet or less in length shall be directly supported on each end by either:
  - ▶ a. The single common stud and a shoulder stud; or
  - ▶ b. The single common stud with a framing anchor attached.

# Headers

- ▶ 2. Headers greater than 3 feet but less than or equal to 6 feet in length shall be directly supported on each end by the single common stud and a shoulder stud.
  - ▶ 3. Headers greater than 6 feet in length shall be directly supported on each end by the single common stud and 2 shoulder studs.
- 

# Wall Bracing

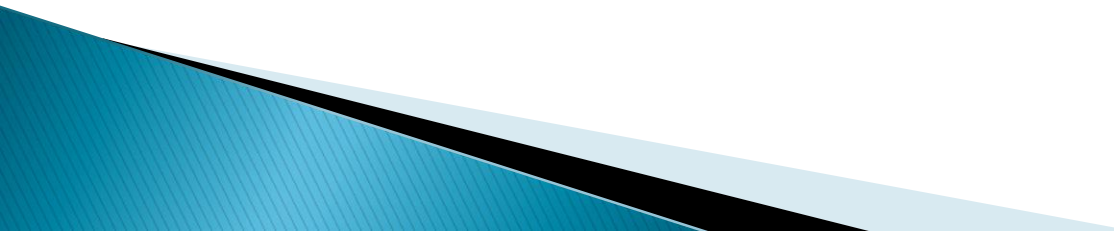
- ▶ Wall Bracing requirements shall be shown on the plans.
- ▶ Wall Bracing Worksheet
- ▶ Bracing Methods should match plans/worksheet
- ▶ Proper nailing patterns
- ▶ Braced panels to proper lengths



# Notching / Boring

- ▶ (4) NOTCHING. Notching and boring of columns or posts is prohibited unless designed through structural analysis.
- ▶ Studs shall not be cut or bored more than  $1/3$  the depth of the stud, unless the stud is reinforced.

# Post/Columns

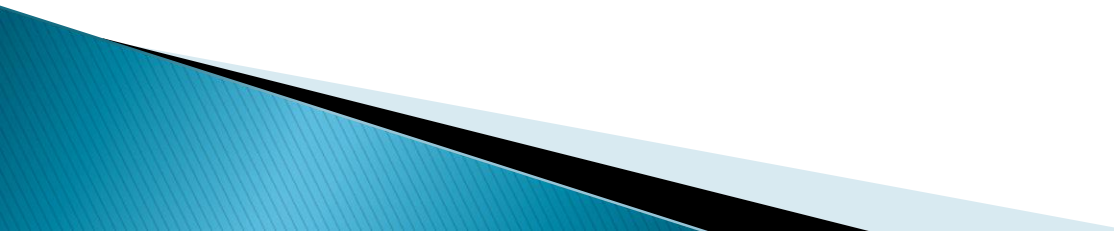
- ▶ 1. Posts and columns shall be installed to resist imposed loads.
  - ▶ 2. Posts and columns shall bear directly over the middle  $1 / 3$  of a footing.
  - ▶ 3. Posts and columns shall be restrained at the top and bottom to resist displacement.
- 





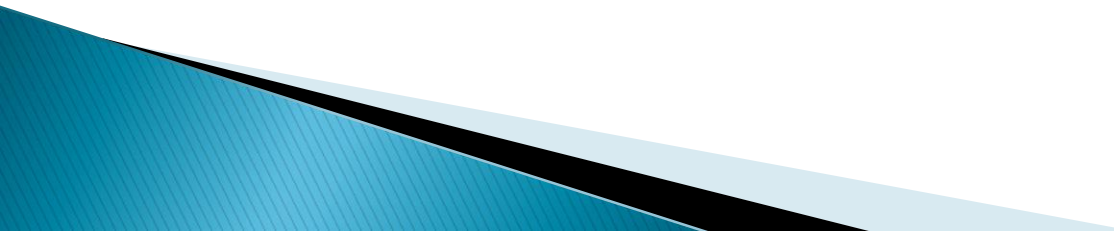


# Post/Columns

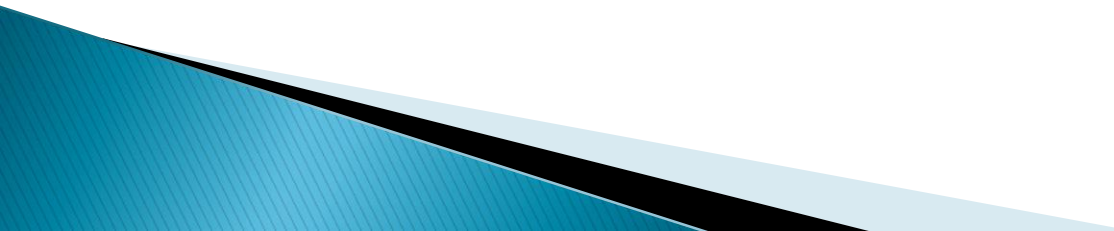
- ▶ 4. All columns shall be positively attached to the beams they support using clips, straps or saddles.
  - ▶ 5. Posts and columns that use a height adjustment mechanism shall have the mechanism imbedded in concrete or permanently disabled after installation.
- 



# Cripple Walls

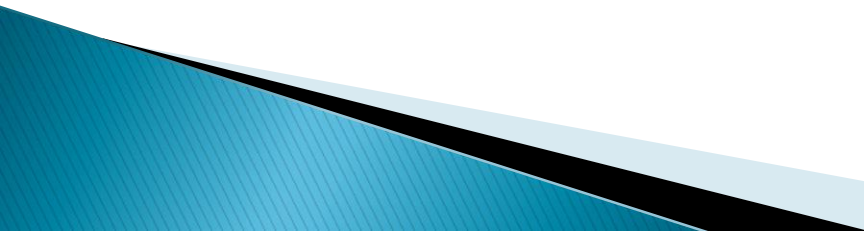
- ▶ (a) Foundation cripple walls shall be framed with studs at least as large as the studs above.
  - ▶ (b) When more than 4 feet in height, cripple walls shall be framed with studs needed for an additional floor level.
- 

# Cripple Walls

- ▶ (c) Cripple walls with a stud height of less than 14 inches shall be sheathed on at least one side for its entire length with a wood structural panel that is fastened to both the top and bottom plates or the cripple walls shall be constructed of solid blocking.
  - ▶ (d) Cripple walls with a stud height of 14 inches or greater shall be braced in accordance with sub. (8).
  - ▶ (e) Cripple walls shall be fully supported by a continuous foundation.
- 



# Treated Wood

- ▶ (1) Wood used in any of the applications under this section shall meet all of the following requirements:
  - ▶ (a) The wood shall be labeled and pressure treated with preservative in accordance with an AWP standard or shall be naturally durable and decay-resistant or shall be engineered to be decay resistant.
  - ▶ (b) The wood shall be pressure treated with preservative or shall be naturally termite-resistant unless additional steps are taken to make the wood termite-resistant.
- 

# Treated Wood

- ▶ (2) Wood used in the following locations shall be as required under sub. (1):
  - ▶ (a) Resting directly upon or embedded in earth.
  - ▶ (b) Floor joists or sleepers that meet all of the following conditions:
    - ▶ 1. The joists or sleepers are protected from the weather.

# Treated Wood

- ▶ 2. The joists or sleepers are within 18 inches above a lower floor surface, deck or soil.
- ▶ 3. There is no vapor retarder that meets the requirements under s. [SPS 322.38 \(1\) \(a\)](#) between the joists or sleepers and the soil below.



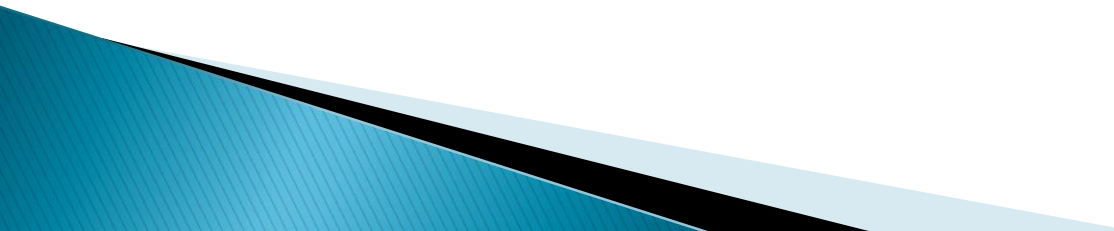


# Treated Wood


- ▶ (d) Girders that span directly over and within 12 inches of earth.
- ▶ (e) Sills and rim joists that rest on concrete or masonry and are also below grade or within 8 inches above final exterior grade.



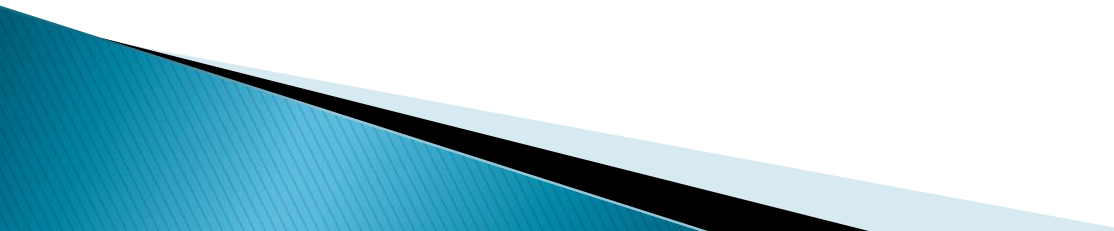
# Treated Wood

- ▶ 1. Siding and sheathing in contact with concrete, masonry or earth and within 6 inches above final exterior grade.
  - ▶ 2. Siding and sheathing in contact with concrete or masonry and within 2 inches above an impervious surface.
- 

# Treated Wood

- ▶ (g) Ends of wood structural members and their shims resting on or supported in masonry or concrete walls and having clearances of less than  $\frac{1}{2}$  inch on the top, sides and ends.
  - ▶ (h) Bottom plates or sole plates of walls that rest on concrete or masonry and that are below exterior grade or less than 8 inches above final exterior grade.
  - ▶ (i) Columns in direct contact with concrete or masonry unless supported by a structural pedestal or plinth block at least one inch above the floor.
  - ▶ (j) Any structural part of an outdoor deck, including the decking.
- 

# Fasteners

- ▶ Fasteners for pressure-preservative treated wood and fire-retardant-treated wood shall meet one of the following requirements:
    - ▶ 1. The fastener is a steel bolt with a diameter of 0.5 inch or greater.
    - ▶ 2. The fastener is made of stainless steel.
- 

# Fasteners

- ▶ 3. The fastener is made of hot-dipped, zinc-galvanized steel with the coating weight and thickness labeled as complying with ASTM A 153.
- ▶ 4. The fastener is made of steel with a mechanically-deposited zinc coating labeled as complying with ASTM B 695, Class 55 or greater.
- ▶ 5. The fastener has coating types and weights in accordance with the fastener manufacturer's recommendations. In the absence of the manufacturer's recommendations subd. 1., 2., 3., or 4. shall apply.

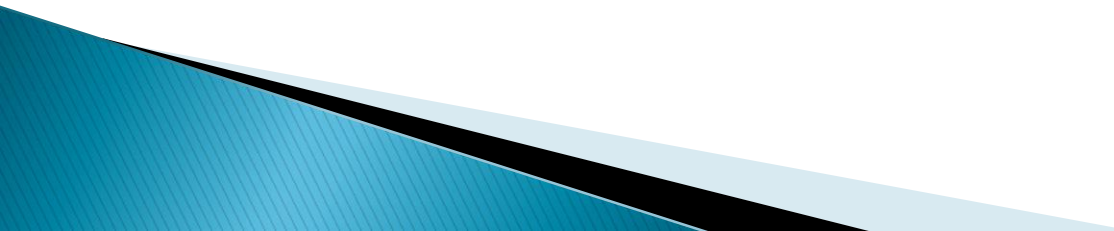
# Fire Blocking Locations

- ▶ 1) FIREBLOCKING LOCATIONS. Fireblocking shall be provided in all of the following locations:
  - ▶ (a) In concealed spaces of walls and partitions, including furred spaces, at the ceiling and floor levels.
  - ▶ (b) At all interconnections between concealed vertical and horizontal spaces including the attachment between a carport and a dwelling.





# FireBlocking Locations

- ▶ c) In concealed spaces between stair stringers at the top and bottom of the run and at any intervening floor level.
  - ▶ (d) At all openings around wires, cables, vents, pipes, ducts, chimneys and fireplaces at ceiling and floor level.
- 





# Fireblocking Materials

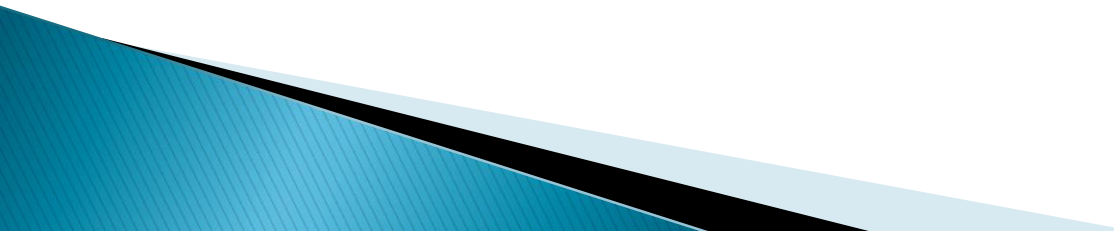
- ▶ (a) 2-inch nominal lumber.
- ▶ (b) Two layers of one-inch nominal lumber.
- ▶ (c) One thickness of  $\frac{3}{4}$ -inch nominal plywood or wood structural panel with any joints backed with the same material.
- ▶ (d) One thickness of  $\frac{1}{2}$ -inch gypsum wallboard, face nailed or face screwed to solid wood, with any joints backed with the same material.



# Fireblocking Materials

- ▶ e) Fiberglass or mineral wool batt insulation may be used if both of the following conditions are met:
  - ▶ 1. The least dimension of the opening may not exceed 4 inches.
  - ▶ 2. The batt shall be installed to fill the entire thickness of the opening or stud cavity.
- ▶ (f) For wires, cables, pipes and vents only, non-shrinking caulk, putty mortar, or similar material may be used provided no dimension of the opening exceeds ½ inch around the penetrating object.
- ▶ (g) For chimneys, fireplaces and metal vents, fireblocking shall be metal, cement board or other noncombustible material.

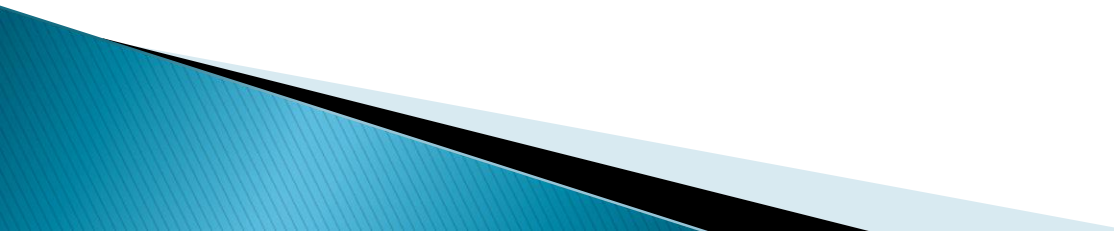
# Fire Separations

- ▶ FIRE SEPARATION. Dwelling units shall be separated
  - ▶ from garage spaces, accessory buildings, property lines and other
  - ▶ dwelling units in accordance with Table 321.08 and the following
  - ▶ requirements:
- 

# Separation Requirements

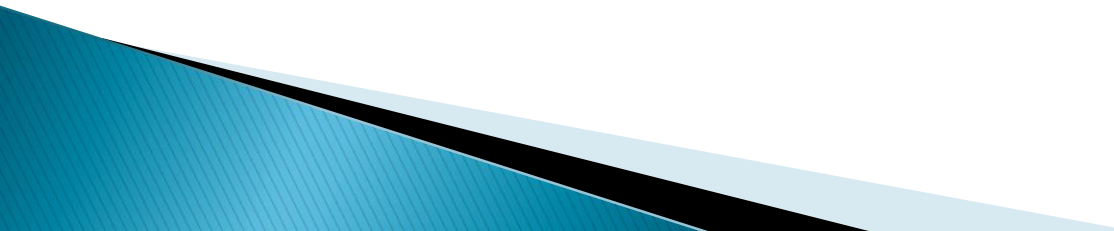
- ▶ (a) *Attached garages.* 1. The walls and ceiling between an attached garage and any portion of the dwelling, including attic or soffit areas, shall be  $\frac{3}{4}$ –hour fire–resistive construction or shall be constructed as specified in any of the following:
  - ▶ a. One layer of  $\frac{5}{8}$ –inch Type X gypsum drywall shall be used on the garage side of the separation wall or ceiling.

# Separation Requirements

- ▶ b. One layer of ½–inch gypsum drywall shall be used on each side of the separation wall or ceiling.
  - ▶ c. Two layers of ½–inch gypsum drywall shall be used on the garage side of the separation wall or ceiling.
- 



# Separation Requirements

- ▶ 2. For all methods listed under subd. 1., drywall joints shall comply with one of the following:
    - ▶ a. Joints shall be taped or sealed.
    - ▶ b. Joints shall be fitted so that the gap is no more than 1 / 20–inch with joints backed by either solid wood or another layer of drywall such that the joints are staggered.
- 



# Separation Requirements

- ▶ (b) *Structural elements exposed in an attached garage.*
- ▶ Beams, columns and bearing walls which are exposed to the garage and which provide support for habitable portions of the
- ▶ dwelling shall be protected by one of the methods specified in par. (a) 1. a. or c. or other  $\frac{3}{4}$  hour fire-resistive protection.

# Doors

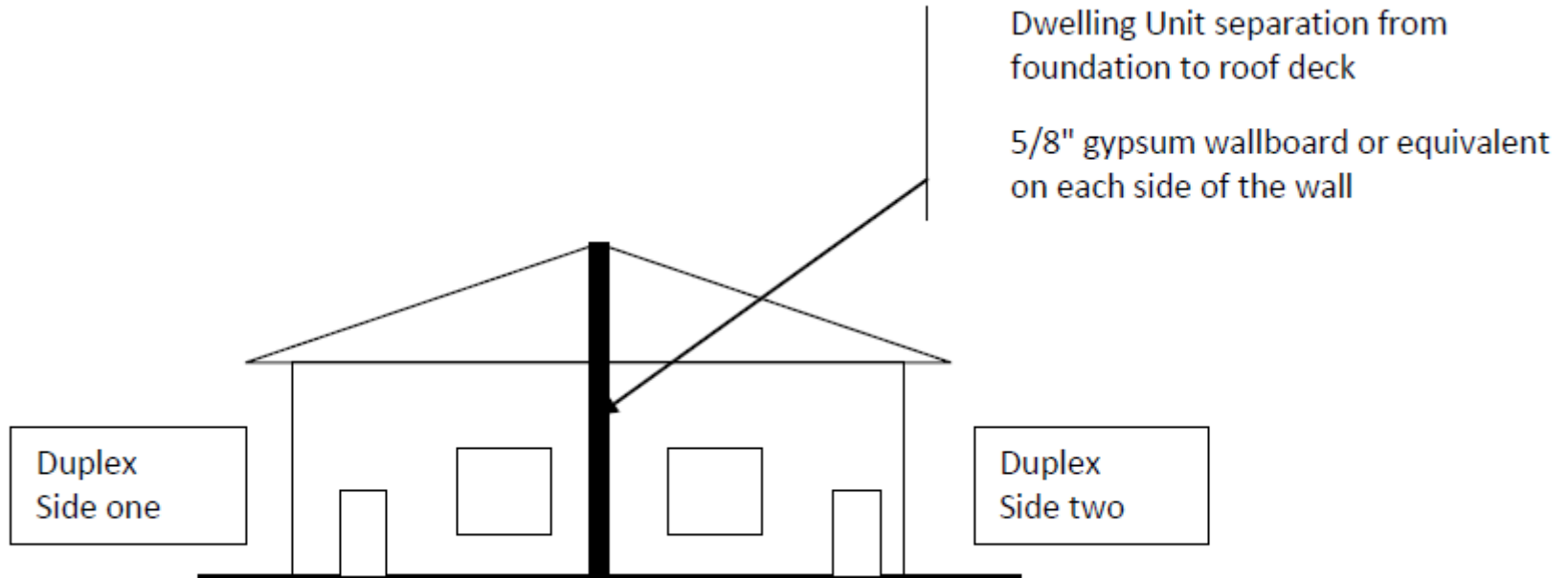
- ▶ (c) *Doors*. 1. The door and frame assembly between the dwelling unit and attached garage shall be 20 minute rated.
- ▶ The test to determine the 20–minute rating is not required to include the hose stream portion of the test.



# Dwelling Unit Separations

- ▶ (2) DWELLING UNIT SEPARATION. (a) *General.*  
In 2-family
  - ▶ dwellings, dwelling units shall be separated from each other and
  - ▶ from shared tenant spaces including attics, basements, garages,
  - ▶ vestibules and corridors.

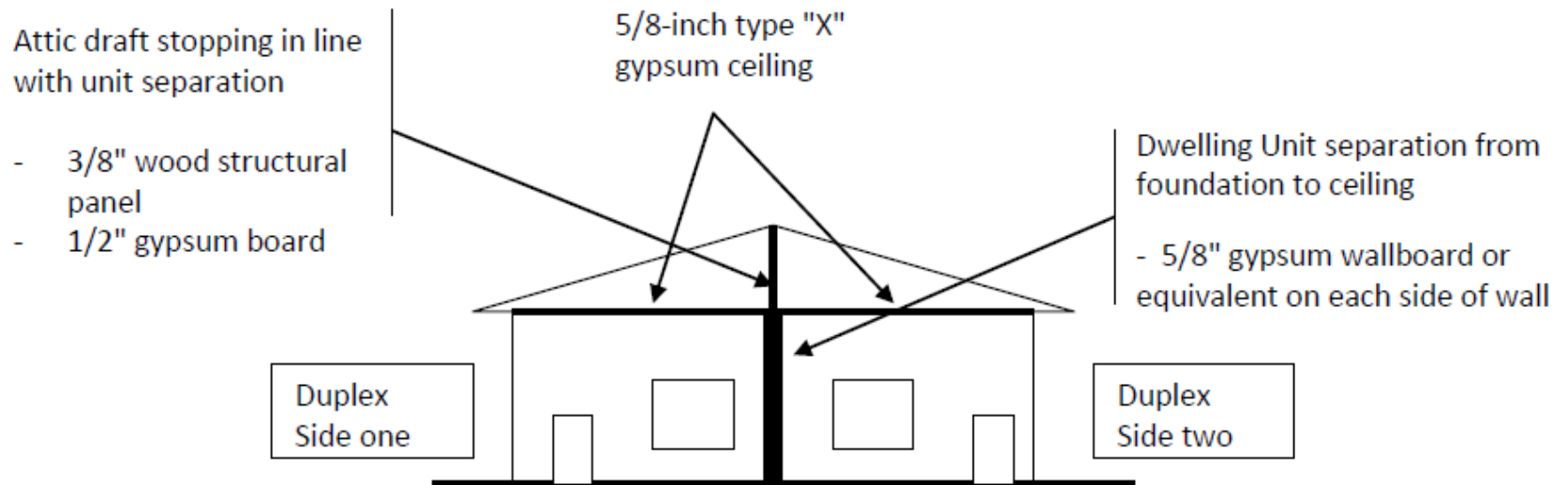
# Separation Options



**Unit Separation per SPS 321.08 (2) (d)  
as referenced in Table 321.08**



# Separation Option



**METHOD #2**  
**SPS 321.08 (2) (b) 2**



# Attic Separations

- ▶ (b) *Attic separation.* Dwelling units with attic space that extends over both units shall be separated in accordance with one of the following:
  - ▶ 1. 'Complete separation.' The units shall be provided with wall construction under par. (d) that extends all the way to the underside of the roof deck.

# Attic Separations

- ▶ 2. 'Vertical and horizontal separation.' a. The units shall be provided with wall construction under par. (d) that extends to the dwelling unit ceiling and ceiling construction under par. (e).
- ▶ b. Dwelling units using this method of separation shall provide attic draft stopping under par. (f) that extends all the way to the underside of the roof deck above and in line with the separation wall.

# Stairs

- ▶ Every interior and exterior stairway attached to, or supported by any part of the structure covered under this code.

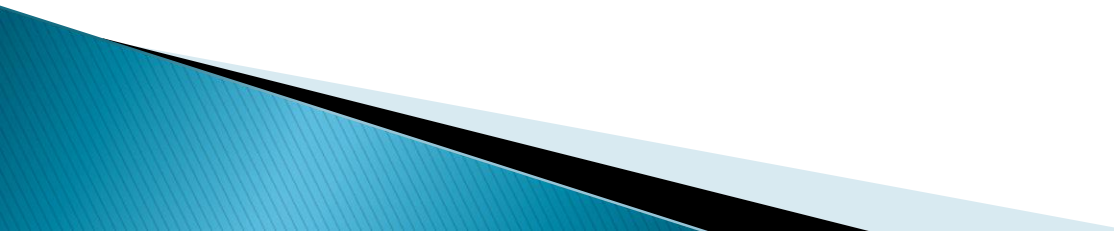
# Not what we're Looking For







# Exemptions

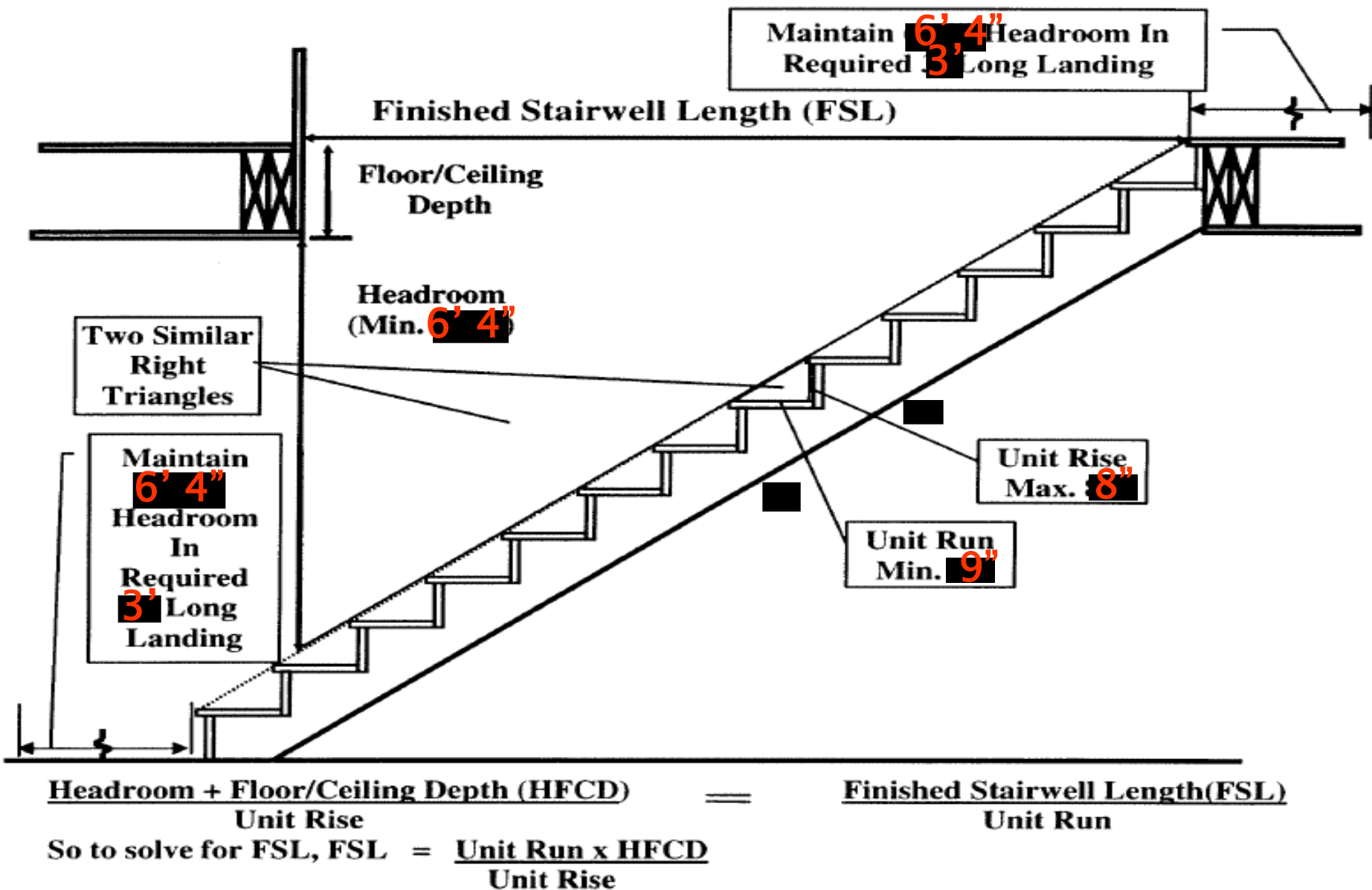
- ▶ 1. Stairways leading to non-habitable attics or crawl spaces.
  - ▶ 2. Non-required stairways connecting the basement directly to the exterior of the structure without communicating with any other part of the structure.
- 



# Details

- ▶ Stairways shall measure at least 36 inches in width. Handrails and associated trim may project a maximum of 4.5 inches into the required width at each side of the stairway. The minimum clear width at and below the handrail, including at treads and landings, may not be less than 31.5 inches where a handrail is installed on one side, and 27 inches where handrails are provided on both sides.

# Simple Stair Measurements

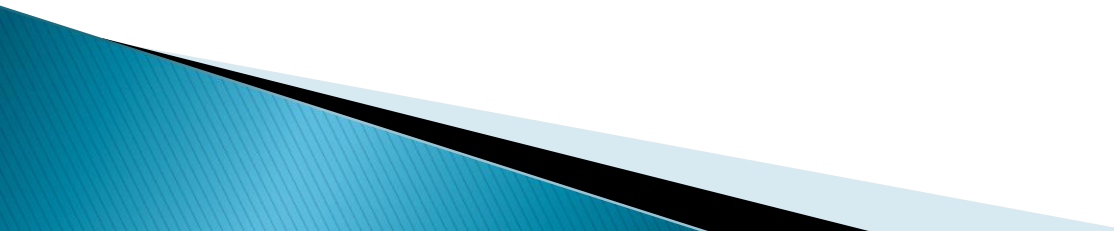


# Risers/Treads

- ▶ Risers may not exceed 8 inches in height measured vertically from tread to tread.
- ▶ Rectangular treads shall have minimum tread depth of 9 inches measured horizontally from nosing to nosing.
- ▶ Within a stairway flight, the greatest tread depth may not exceed the smallest tread depth by more than  $\frac{3}{8}$  inch and the greatest riser height may not exceed the smallest riser height by more than  $\frac{3}{8}$  inch.



# Headroom

- ▶ 1. Stairways shall be provided with a minimum headroom clearance of 76 inches measured vertically from a line parallel to the nosing of the treads to the ceiling, soffit or any overhead obstruction directly above that line.
  - ▶ 2. The headroom clearance shall be maintained over an intermediate landing.
  - ▶ 3. The headroom clearance shall be maintained over a landing that is at the top or bottom of a stairway for a minimum distance of 36 inches in the direction of travel of the stairway.
- 



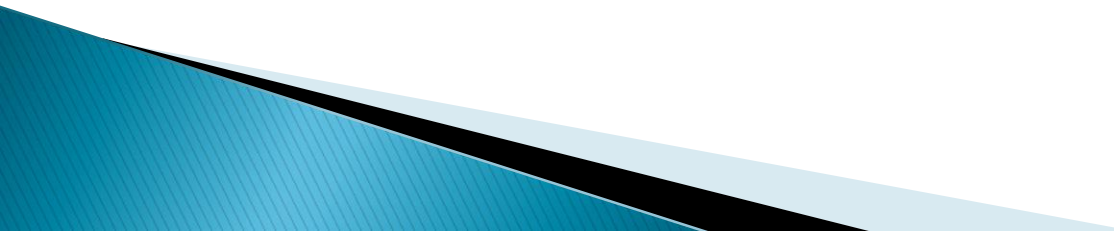


# Beautiful – What's the Problem?

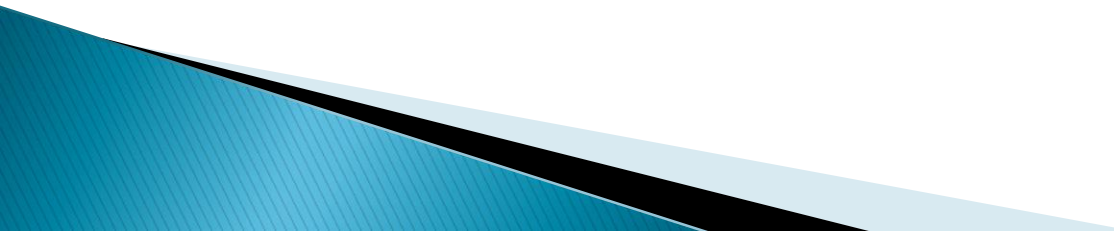




# Handrails

- ▶ Required with more than 3 risers.
  - ▶ Guards shall be constructed to prevent the through-passage of a sphere with a diameter of  $4 \frac{3}{8}$  inches, when applying a force of 4 pounds.
  - ▶ The triangular area formed by the tread, riser and bottom rail shall have an opening size that prevents the through-passage of a sphere with a diameter of 6 inches.
- 

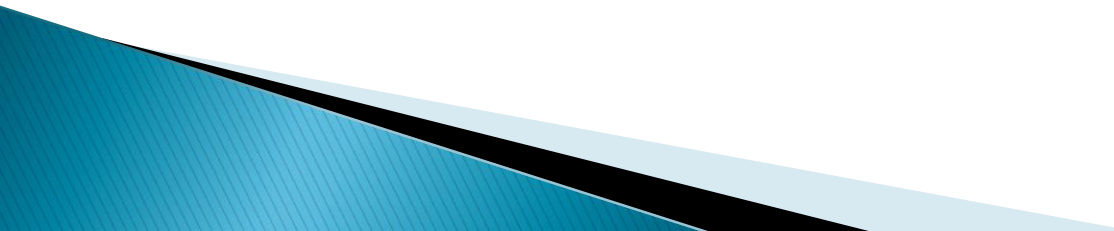
# Handrails

- ▶ a. Handrails and guards shall be designed and constructed to withstand a 200 pound load applied in any direction.
  - ▶ b. Handrail or guard infill components, balusters and panel fillers shall withstand a horizontally applied perpendicular load of 50 pounds on any one-foot-square area.
  - ▶ c. Glazing used in handrail or guard assemblies shall be safety glazing.
- 

# Handrail Height

- ▶ Handrails shall be located at least 30 inches, but no more than 38 inches above the nosing of the treads, except as provided in subds. 1. b. to d. Measurement shall be taken from the hard structural surface beneath any finish material to the top of the rail. Variations in uniformity are allowed only when a rail contacts a wall or newel post or where a turnout or volute is provided at the bottom tread

# Handrails

- ▶ The clearance between a handrail and the wall surface shall be at least 1 1/2 inches.
  - ▶ Handrails and associated trim may project into the required width of stairs and landings a maximum of 4 1/2 inches on each side.
  - ▶ Handrails shall be continuous for the entire length of the stairs
- 

# Size and Configuration

- ▶ Handrails shall be symmetrical about the vertical centerline to allow for equal wraparound of the thumb and fingers.
- ▶ a. Handrails with a round or truncated round cross sectional gripping surface shall have a maximum whole diameter of 2 inches.
- ▶ b. Handrails with a rectangular cross sectional gripping surface shall have a maximum perimeter of  $6 \frac{1}{4}$  inches with a maximum cross sectional dimension of  $2 \frac{7}{8}$  inches.
- ▶ c. Handrails with other cross sections shall have a maximum cross sectional dimension of the gripping surface of  $2 \frac{7}{8}$  inches with a maximum linear gripping surface measurement of  $6 \frac{1}{4}$  inches and a minimum linear gripping surface of 4 inches.

# Example.

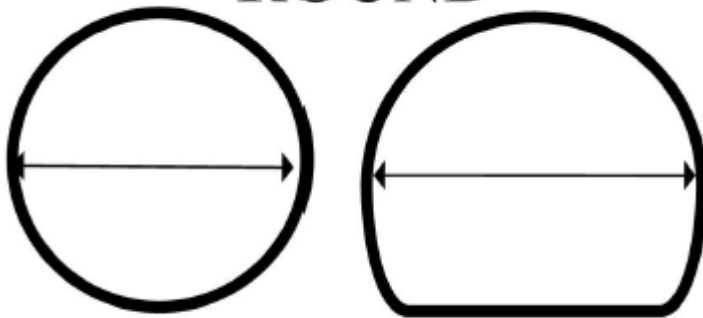
**MAXIMUM  $2\frac{7}{8}$ "**  
**CROSS SECTION**

**4" to  $6\frac{1}{4}$ " gripping surface,  
including a  
minimum  $\frac{1}{4}$ " recess on  
each side**



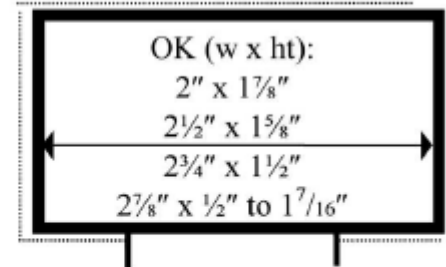
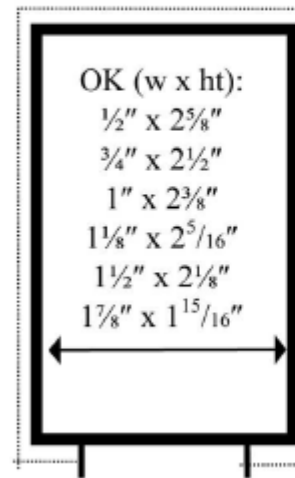
# Other Options

## ROUND



**MAXIMUM 2"**  
**DIAMETER**

## RECTANGULAR



**MAXIMUM 2 $\frac{7}{8}"$**   
**CROSS SECTION**

**Maximum 6 $\frac{1}{4}"$**

'Application.' a. All openings between floors, and open sides of landings, platforms, balconies or porches that are more than 24 inches above grade or a floor shall be protected with guardrails.

b. The requirements under subpar. a. apply where insect screens are the only means of enclosure or protection for a surface that is more than 24 inches above grade or a floor.

c. For exterior applications, the 24 inch vertical measurement shall be taken from the lowest point within 3 feet horizontally from the edge of the deck, landing, porch or similar structure.



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# Landings

- ▶ *Landings at the top and base of stairs.* A level landing shall be provided at the top and base of every stairs except as provided in par. (d). The landing shall be at least as wide as the treads and shall measure at least 3 feet in the direction of travel.

# Landings

- ▶ The exterior landing, platform, or sidewalk at an exterior doorway shall be located a maximum of 8 inches below the interior floor elevation, be sloped away from the doorway at a minimal rate that ensures drainage, and have a length of at least 36 inches in the direction of travel out of the dwelling.

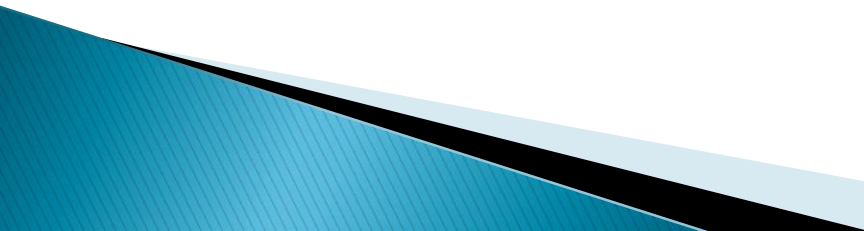


# Landings

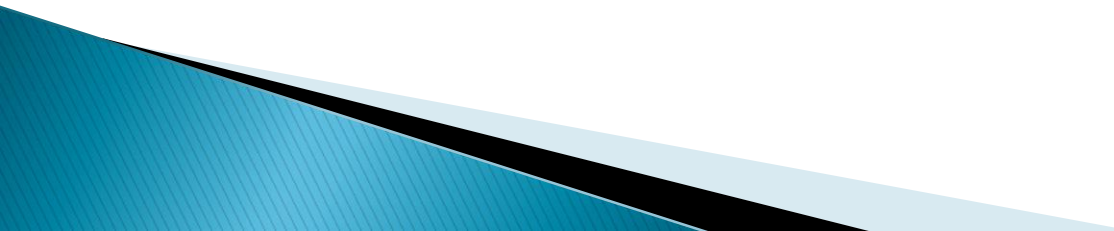
- ▶ *Doors at landings.* Except as provided in subds. 1. to 3. and par. (d), level landings shall be provided on each side of any door located at the top or base of a stair, regardless of the direction of swing
- ▶ In the following exceptions, a stairway between a dwelling and an attached garage, carport or porch is considered to be an interior stair



# Exceptions

- ▶ 1. A landing is not required between the door and the top of interior stairs if the door does not swing over the stairs.
  - ▶ 2. A landing is not required between the door and the top of an interior stairs of 1 or 2 risers regardless of the direction of swing.
  - ▶ 3. A landing is not required between a sliding glass door or an in-swinging glass door and the top of an exterior stairway of 3 or fewer risers.
- 

# Brick Veneer

- ▶ 1. Masonry veneers may be corbeled over the foundation wall, but the corbeling shall not exceed one inch.
  - ▶ 2. A minimum one-inch air space shall be provided between the veneer and the sheathing unless a manufactured offset material is used.
  - ▶ 3. Where no brick ledge is formed in the foundation wall, corrosion resistant metal or other water-resistant flashing shall extend over the top of the foundation wall from the outside face of the wall and shall extend at least 6 inches up on the sheathing. The flashing shall be installed to drain any water outward.
- 

# Brick Veneer

- ▶ 4. Weep holes shall be provided at the bottom masonry course at maximum intervals of 2 feet.
- ▶ 5. Ventilation openings shall be provided at the top of the wall.

# Brick Veneer

- ▶ Assure Flashing is provided and installed to drain water away from all structural members.



# Floor Joist

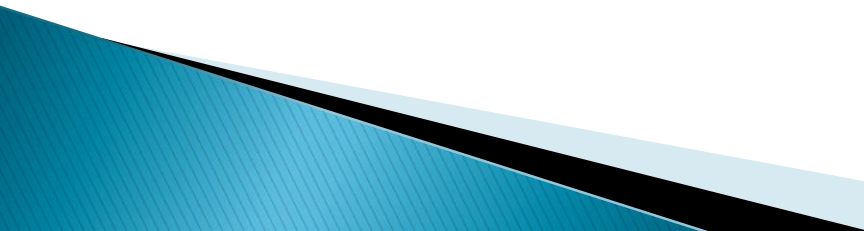
- ▶ Sized per approved plans
- ▶ Decay protection when within 18" of earth
- ▶ Bearing requirements:
  - ▶ 3" minimum on masonry
  - ▶ 1 ½" on wood.

# Floor Joist

- ▶ (c) *Floor joists on masonry walls with a solid top course.* Where a sill plate is provided for floor joists on solid block top course masonry, the sill plate shall be fastened to the foundation.



# Floor Joist

- ▶ (d) *Floor joists on masonry walls with open top course.*
  - ▶ 1. Where the masonry wall has an open top course, a sill plate at least as wide as the foundation wall shall be fastened to the foundation.
  - ▶ 2. Where anchor bolts are used on masonry walls with an open top course, the minimum width of an individual piece making up the sill plate shall be at least 5.5 inches.
- 

# *Notching of floor joists*

- ▶ 1. Notches located in the top or bottom of floor joists shall not have a depth exceeding  $\frac{1}{6}$  the depth of the joist, shall not have a length exceeding  $\frac{1}{3}$  the joist depth nor be located in the middle  $\frac{1}{3}$  of the span of the joist.
- ▶ 2. Where floor joists are notched on the ends, the notch shall not exceed  $\frac{1}{4}$  the depth of the joist. Notches over supports may extend the full bearing width of the support.

# Joist Overhangs

- ▶ Maximum depth of joist without conditions or structural analysis.
- ▶ Overhangs  $>$  depth of joist, see code for conditions. If the conditions are not met, structural analysis is required.

# Floor Openings

- ▶ Trimmers and headers shall be doubled when the span of the header exceeds 4 feet. Headers which span more than 6 feet shall have the ends supported by joist hangers or framing anchors, unless the ends are supported on a partition or beam. Tail joists (joists which frame into headers) more than 8 feet long shall be supported on metal framing anchors or on ledger strips of at least 2 inches by 2 inches nominal.

# BRIDGING.

- ▶ Bridging shall be provided for sawn lumber framing at intervals not exceeding 8 feet where the nominal depth to thickness ratio is greater than 4 to 1.
- ▶ **Note:** This 4:1 ratio means bridging is required for wood-framed floors having nominal 2X10 or deeper solid-sawn-lumber joists, to provide restraint against rotation or lateral displacement.

# Beams

- ▶ Wood girders and beams shall be fitted at the post or column. Adjoining ends shall be fastened to each other to transfer horizontal loads across the joint. Beams shall also be fastened to the posts with framing anchors, angle clips, or equivalent.



# Beams

- ▶ Where intermediate beams are used, they shall rest on top of the girders; or shall be supported by ledgers or blocks fastened to the sides of the girders; or they may be supported by approved metal hangers into which the ends of the beams shall be fitted.

# Beams

- ▶ Lateral restraint for all wood beams shall be provided at all columns using a saddle or other approved connection where the beam meets one of the following conditions:
  - ▶ 1. The beam is not restrained at both ends.
  - ▶ 2. The beam is more than 11.25 inches deep using actual measurement.





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# Beams

- ▶ NOTCHING AND BORING. Notching and boring of beams or girders is prohibited unless determined through structural analysis



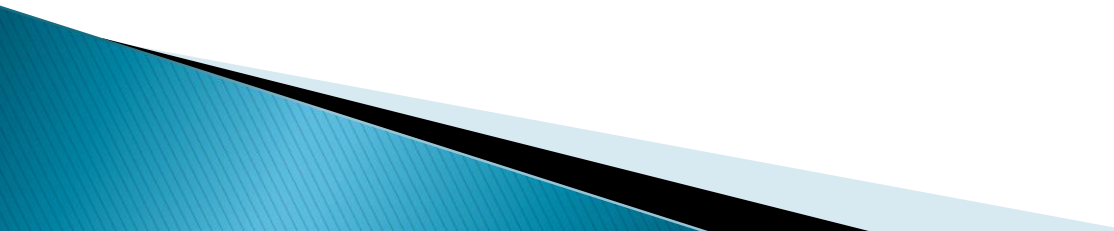




# Beams Bearing

- ▶ Beams and girders made of sawn lumber shall have a bearing surface on their supports of at least 3 inches parallel to the beam or girder and be at least as wide as the beam or girder.

# Foundations

- ▶ (b) *Lateral support at base.* Lateral support such as floor slabs or framing shall be provided at the base of foundation walls.
  - ▶ (c) *Lateral support at top.* Lateral support shall be provided at the top of the foundation walls by one of the following:
- 



# Foundations

- ▶ Anchor bolts.
- ▶ a. Structural steel anchor bolts, at least 1 / 2 inch in diameter, embedded at least 7 inches into the concrete or grouted masonry with a maximum spacing of 72 inches and located within 18 inches of wall corners.
- ▶ b. A properly sized nut and washer shall be tightened on each bolt to the plate or sill.



# Foundations

- ▶ c. When vertical-reinforcing steel is provided in masonry construction, as required under sub. (3), the location requirements under subd. 3. a. shall be modified as necessary so anchor bolts are placed in the same core as the reinforcement without exceeding the limits of subd. 3. a.
- ▶ d. Alternate foundation anchorage, designed and spaced in accordance with structural analysis and as required to provide equivalent anchorage to the requirements of subd. 3. a., is allowable.

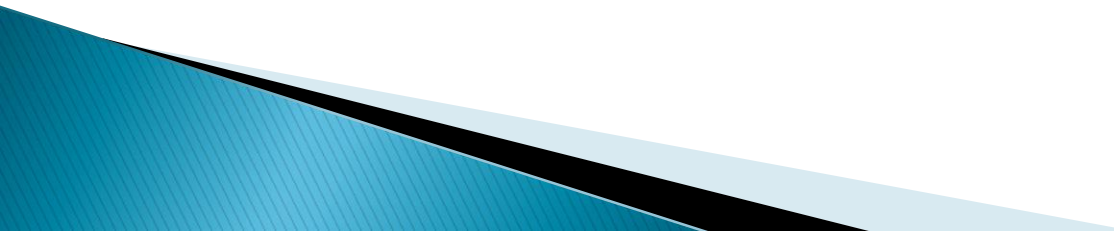
# Foundations

- ▶ a. Where the floor framing is parallel to the foundation wall, solid blocking or bridging shall be installed in at least the first adjacent joist space at a spacing of no more than 32 inches on center.
- ▶ b. Blocking and bridging shall be the same depth as the joist.
- ▶ c. Fastening of the blocking or bridging shall be in accordance with structural analysis or the fastener schedule in Table 321.02-2.





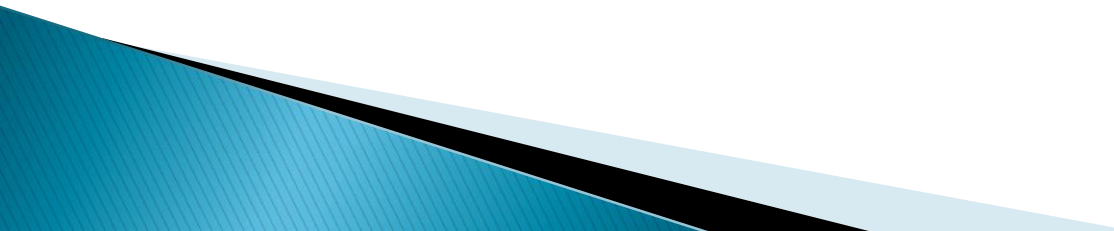
# Final Inspection

- ▶ Grade away from the dwelling as required by SPS 321.10.
  - ▶ The finished grade of the soil shall slope away from the dwelling at a rate of at least 1 / 2 inch per foot for at least 10 feet.
  - ▶ Where lot lines, walls, slopes, or other barriers prevent having the 10-foot distance in sub. (2), swales or other means shall be provided to ensure equivalent drainage away from the dwelling.
- 

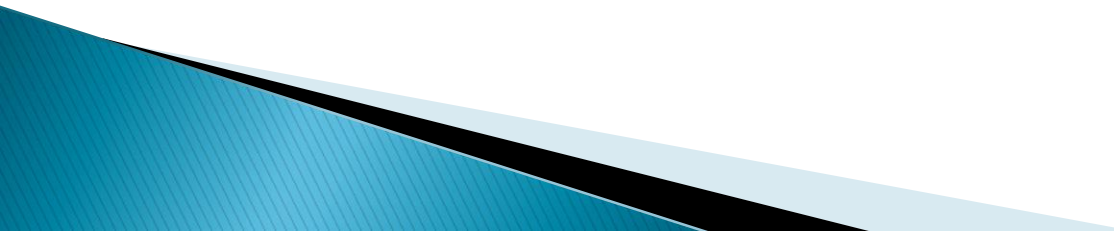
# Erosion Control

- ▶ Erosion and sediment control practices shall be maintained until the disturbed areas are stabilized. A disturbed area shall be considered stabilized by vegetation when a perennial cover has been established with a density of at least 70%.

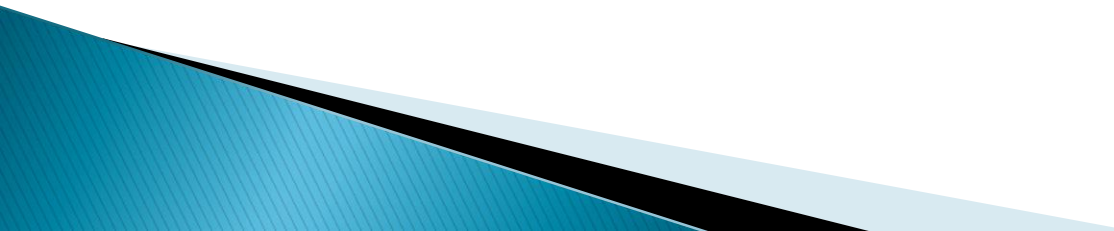
# Foundation Insulation

- ▶ (a) Exterior foam plastic insulation shall be protected from physical damage and damage from ultraviolet light with a permanent, opaque, weather-resistant covering or coating.
  - ▶ (b) The protective covering shall cover the exposed exterior insulation and extend a minimum of 2 inches below grade, except the covering is not required below a brick ledge.
- 

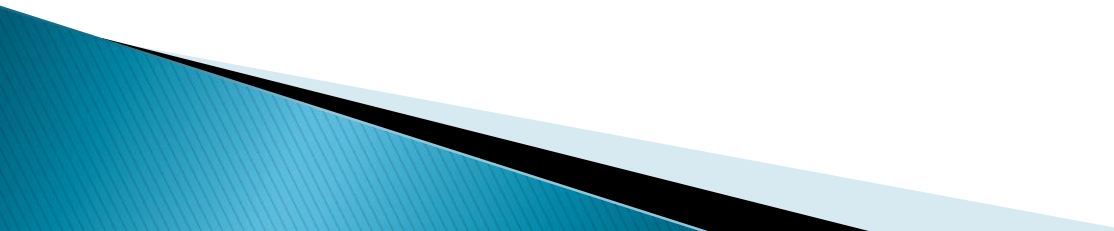
# Caulking, Sealing, & Flashing

- ▶ Check all penetrations, joints, and openings to assure proper sealing and flashing.
  - ▶ Special attention to flashing at chimneys, decks, and elevated door openings.
  - ▶ Sealants shall be exterior grade, and compatible with materials they are used on.
- 

# Decks and Patios

- ▶ Proper deck construction
  - ▶ Guards (if required)
  - ▶ Exterior Stairs
- 

# Final Inspection (interior)

- ▶ Smoke detectors in each sleeping room.
  - ▶ Outside sleeping rooms within 21 feet.
  - ▶ 1 alarm on levels with no sleeping room.
  - ▶ Hardwired per code.
  - ▶ CO detector each floor level.
- 

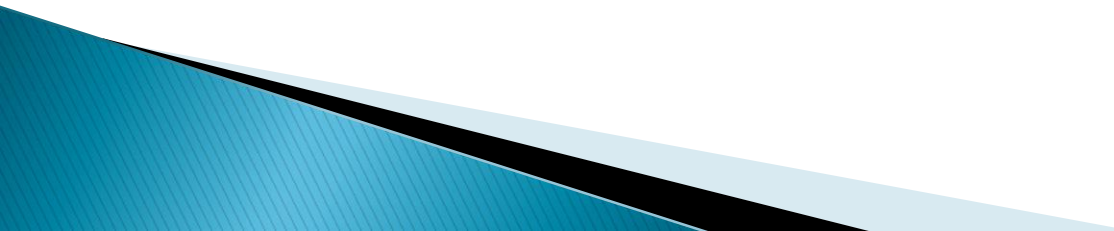


# Attic-Access Cover to be Insulated SPS 322.32(1)(b)



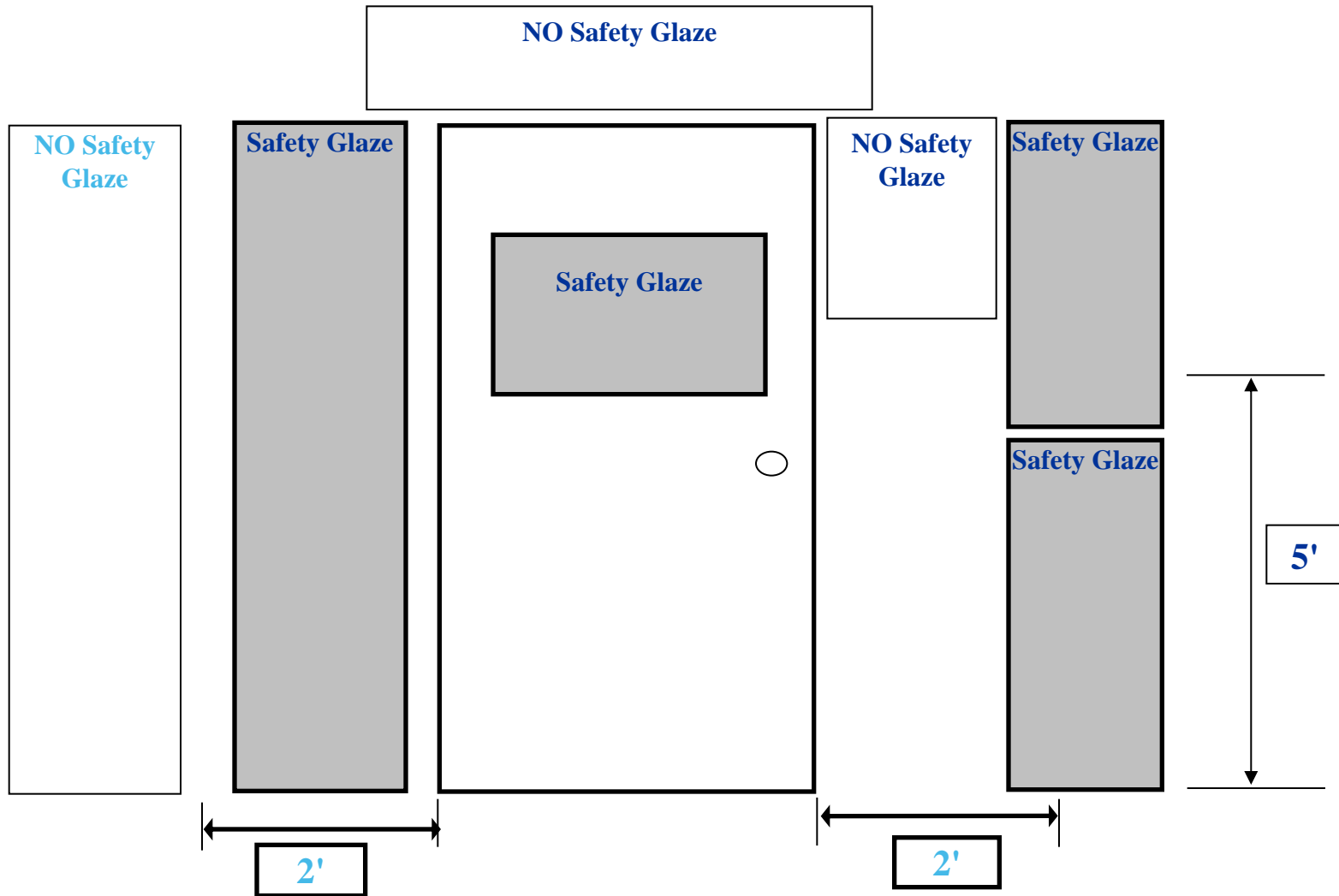
- ▶ To be weatherstripped & insulated to level equivalent to insulation on the surrounding surfaces
- ▶ Wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is used
- ▶ Req't to prevent loose fill insulation from spill into living space, as well as provide permanent means of maintaining the installed R-value

# Garage Separation Requirements

- ▶ Proper door/frame assembly
  - ▶ Protection of beams/columns supporting living space above.
  - ▶ Separation maintained through attic/eaves as required.
- 

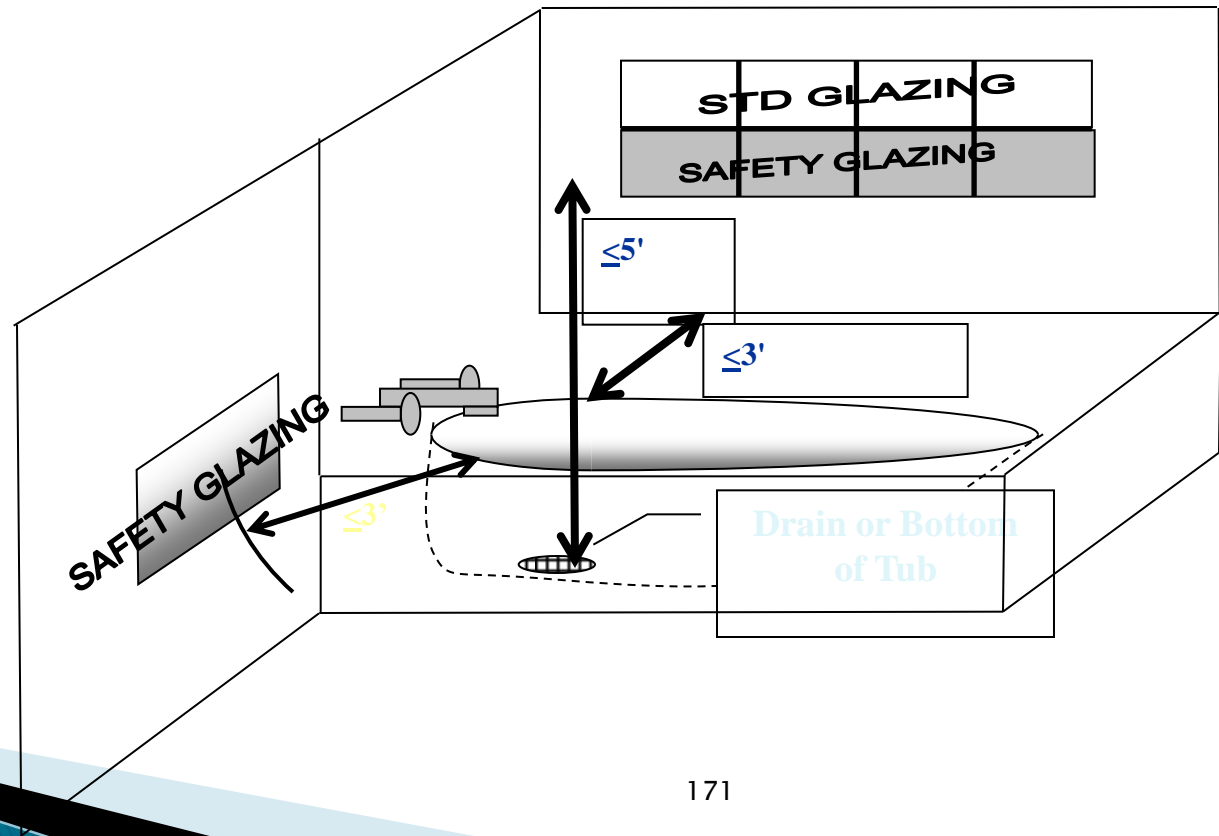
# Safety Glazing

- ▶ Check all doors and sidelights.
- ▶ Windows in Bathrooms and as required.



# SPS 321.05 (3) Safety Glazing

(b) In any wall where the glazing is within 5 feet vertically of the lowest drain inlet and within 3 feet horizontally of the nearest part of the inner rim of a bathtub, hot tub, shower, spa or whirlpool appliance.



# Interior Stairs

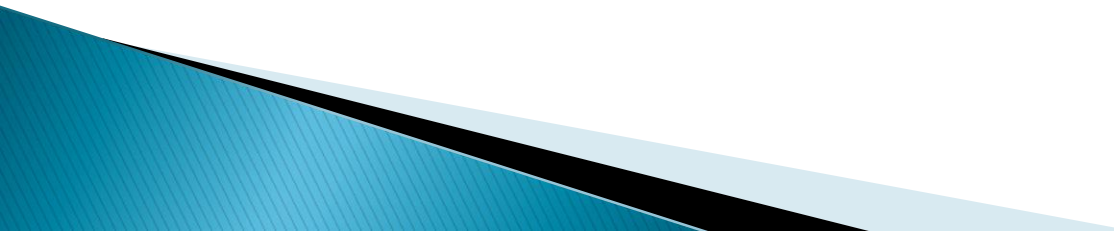
- ▶ Riser /Tread
  - ▶ Handrail/ Guard
  - ▶ Headroom
  - ▶ Landings
- 



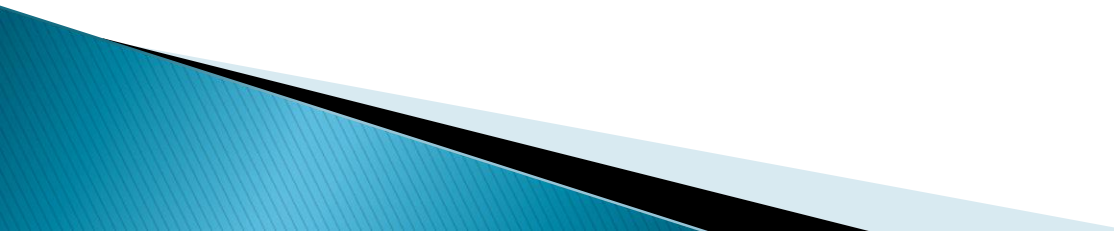
# Egress Windows

- ▶ Egress windows in Bedrooms on second floor and/or basement where no second exit provided.

# Basement Level

- ▶ Columns secured to beams.
  - ▶ Proper bearing of beams at columns.
  - ▶ Columns anchored to floor
  - ▶ Box sill insulation
- 

# Basement Level

- ▶ Fire-stopping at chimneys, vents, ducts, ect.
  - ▶ RE-check notching and/or boring of joists
  - ▶ Re-check floor joist and header supports.
- 

# THANK YOU

- ▶ Any questions?
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- ▶ (920)360-0020

